

App. F. IX-4.

Previous References.

1940.

G. P.

G. P. File No. 53/40

Serial Nos. 1-12

(all 88.)

Later References.

GENERAL AND REVENUE SECRETARIAT

Serial Nos. 12

P. 311
E

Part B for Feb 5 '40.

SUBJECT

Manufacture of Potassium Salt-
by Dr A. V. Varadachari

INDUSTRIAL RESEARCH BOARD.

BOARD OF INDUSTRIES AND COMMERCE.

UTILISATION OF MOLASSES FOR THE MANUFACTURE OF

Subject..... POTASSIUM SALTS.....

File No. 150/40-1 of

19 Dated, 13th December '40.

150/40-1

13/12/40.

Submitted.

'E'

(1)

In the Board meeting held on 3rd September 1940, it was decided that details regarding cost etc. to handle ten tons of molasses as an experimental measure in the proposed pilot plant, should be obtained from Dr. Varadarajalingar and placed before the Board.

'O'

(2)

The estimate, etc. furnished by him put up herewith was also discussed at the Board of Industries and Commerce meeting held on 25th November 1940 and it was unanimously agreed that the scheme might be recommended to Government for sanction.

(3)

Subsequent to this meeting, under the instructions of the Chairman the file was referred to Dr. Ghosh for his expert opinion on the workability of the scheme.

(4)

Dr. Ghosh has recommended that the scheme of putting up a pilot plant for the extraction of potassium from molasses might be taken up vide his letter No. D.1744 dated 6th Decr. 40 put up for kind perusal.

'Q'

'P'

(5)

Letter dated 6th December 1940 of Dr. A. V. Varadarajalingar forwarding a report on the results of experiments on the fermentability of Depotashed molasses is also put up for perusal.

(6)

The place of conducting the investigations whether at the Government Industrial and Testing Laboratory or at Mysore Sugar Factory, Mandya will have to be settled. The Chairman, Mysore Sugar Co., Ltd., has already intimated in his letter dated 11th April 1940 that to try the experiments in a factory or even on a semi-factory scale, in the Sugar Factory, would be exceedingly difficult and very expensive. The only

'T'

INDUSTRIAL RESEARCH BOARD.

BOARD OF INDUSTRIES AND COMMERCE.

UTILISATION OF MOLASSES FOR THE PRODUCTION

Subject.....POTASSIUM SALTS.....

File No. 1 of 19 .

-2-

only assistance promised by him is to give 100 tons of molasses free of cost. It is therefore suggested that the investigations may be conducted at the Industrial and Testing Laboratory, the required quantity of molasses being transported from Mandya to the Laboratory.

(7) Dr. Ghosh, in his letter under reference suggests that Dr. Varadarajaiengar expects an honorarium of Rs. 1,000/- for conducting the pilot plant investigations.

(8) Whether Dr. Varadarajaiengar, is to be paid the honorarium of Rs. 1,000/- irrespective of the results of the pilot plant investigations is a point for orders.

(9) If approved, the scheme will be recommended to Government for sanction of Rs. 3,000/- (the question of honorarium to Dr. Varadarajaiengar being kept for separate consideration), under the following conditions; the expenditure being met out of the GENERAL RESERVE OF INDUSTRIAL CONCERNS i.e. Rs. 1,24,000/- at the credit of this Reserve vide G.O. No. D. 5934/I&C. 376-39-4 dated 27/28th June 1940.

- 1) The payment of the grant of Rs. 3,000/- earmarked for this experimental manufacture would be made to Dr. Varadarajaiengar, on bills presented by him and countersigned by GOVERNMENT DIRECTOR OF INDUSTRIAL CONCERNS. Dr. Varadarajaiengar should furnish detailed accounts supported by vouchers.
- 2) The equipment, raw-materials unutilised, manufactured products of the pilot plant shall be the property of Mysore Government.
- 3) The results of experimental investigations and manufacture shall be the exclusive property of Mysore Government, subject to the proviso that if these results are commercially exploited, suitable compensation is to be paid to Dr. Varadarajaiengar.

(10) Dr. Varadarajaiengar, is agreeable to the above

(Continued on next page)

INDUSTRIAL RESEARCH BOARD.

BOARD OF INDUSTRIES AND COMMERCE:

UTILISATION OF MOLASSES FOR THE PRODUCTION OF

Subject..... POTASSIUM SALTS.....

File No. 674 of 19 .

-3-

above conditions vide his letter of the 11th December 1940 put up for kind perusal.

For Orders.

K. S. Srinivasulu

Secretary,
Industrial Research Board 13/12.
Bangalore.

CHAIRMAN)

(11)

We may address the Chairman of the Mysore Sugar Company and enquire if the Company is willing to have the experiments conducted at Mysore and to meet the cost involved

all

(12)

K

15/12/40

17/12.

(13)

Draft Letter to The Chairman, Mysore Sugar Co. Ltd. put up for kind attl.

9/3

17/12/40.

(14)

K

17/12

Secretary)

(15)

9/3

Forwarded on 18/12

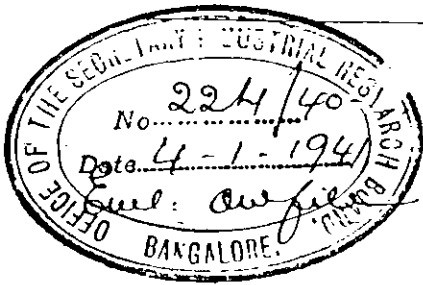
18/12/40.

INDUSTRIAL RESEARCH BOARD.

BOARD OF INDUSTRIES AND COMMERCE.

Utilisation of Molasses for the
Subject...production...of...potassium...salts.....

File No. -4- of 19 .



'G'

16. Letter No. C.19/5253 dated 23rd Decr 40 from the Secretary, Mysore Sugar Company, Ltd. requesting that the connected papers sent by the Chairman, of the Company to the first member of Council, may be returned to him, is put up for kind perusal.

'T'

17 As per orders, the Chairman, Mysore Sugar Company, Ltd., was requested to intimate if the Company is willing to have the experiments conducted at Mandya and to meet the cost involved. No definite reply has been received in this behalf. The file of papers referred to above put up herewith will be returned to the Secretary, Mysore Sugar Co., Ltd, as desired. He will be requested to expedite the reply.

Dated, 3rd Jany.41.

[Signature]
Secretary. 6/1
[Signature]

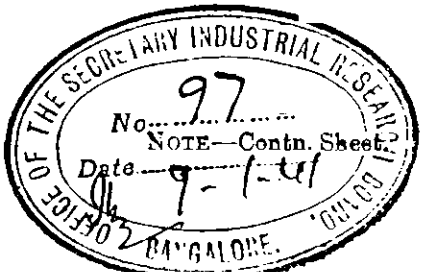
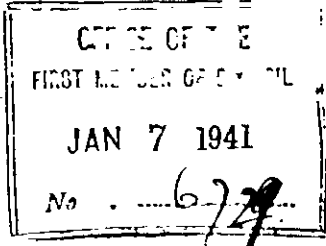
Chairman)

'R'

18 In view of another letter (Enclosed) received to-day from the Secy, Mysore Sugar Co., the connected papers have been sent to him.

Chairman)

[Signature]
6/1



WD 06643-GPB-500-20-5-10

(21)

Draft Letter to Sugar Co, Put up
[Signature] 18/1/41
Issued.

(19)

(20)

[Signature]
8/1/41

NOTE.

Subject

Potassium Salts

File No.

of

19

- 5 -

(22) Reminder issued on 23. 1. 41.
J₃

(23) In reply to the above, the Secy. Sugar Co, intimates that they have asked Dr A.W.V to furnish definite plans and drawing & that on receipt of his reply the matter would be placed before their BS for decision.
For Perusal
J₃

28/1/41. (24) Seen by Secy.
28/1.

(25) Further reminder issued on 28/2

(26) The Secy. of the Sugar Co, has now intimated that the detail furnished by Dr. A.W.V. has been forwarded to the J.L. Manager of the Factory & that his reply is awaited.

(27) It is for orders if the file of papers with the latest letter of the Sugar Co is to be submitted to the Chairman for Perusal
See 4/3/41

(28) Sugar Co
Reminded (a week hence).

NOTE—Contn. Sheet

4 3 41

J₃

WD 91345—GPB—750 7-1-41

NOTE.

Subject

Manufacture of Potassium
Salts from Neolassel.

File No.

of

19

-6-

(29) As per letter, D & F letter to the Chairman, Mys Sugar Co, is herewith put up.

16

29/4/41

Secy.)

(30) Signed by Secy
Issued on 29/4.

(31) The Secy, Mysore Sugar Co, in reply to this office letter of the 29th April, forwards the report of the General Manager of the Sugar Factory who states that the report would be placed before their Board & their decision intimated very early.

(32) According to the report of the Gen. Manager of the Sugar Factory the cost of one ton Potash Sulphate is Rs 282/5/- F.O.B. Mandya while the London market is Rs 250/- . He ^{therefore} is of the opinion that the Scheme ~~therefore~~ do not hold out any promise of success.

As the ~~Scheme~~

NOTE.

Subject Manufacture of Potassium
Salts from Molasses

File No.

of

19

- 7 -

(33) While answering the note of the General Manager, Dr. A.V.V. has worked out the costs and he estimates the cost of production at Rs 245/- per ton and adds that the high price of Sulphuric acid is the chief limiting factor in the adoption of the process. Perhaps, ~~the~~ Sulphuric acid may be obtained from the M. C. F.

(34) Further to this, Dr. A.V.V. has also forwarded a copy of his letter addressed to the Chairman, Dyar Co, in reply to the proceedings of the meeting of the Dyar Factory Bd of Directors, in which Dr. A.V. was also present. The sense of the meeting as stated by Dr. A.V. is that Dr. A.V. cannot expect any remuneration or concession from the Co, beyond the opportunity given to him to conduct the trial operations for which he should assign all his patent rights

NOTE.

Subject

Manufacture of Potassium
Salt

File No.

of

19

- 8 -

Since the investigations have been approved by the Board & that he had consented to the clause that the results of investigations shall be the property of I.R.B. Govt. & that when the scheme is commercially exploited suitable compensation would be paid to him he now seeks the advice of the Board. Sugar Co have not yet indicated their views.

JH

18/6/41.

(35) Reminder to Sugar Company issued on 13.6.41 as per instructions

JH

18/6.

(36) Dr. A.V.V. addressed on 19/6/41 (as per instructions) to expedite his reply to Sugar Co. The Sugar, Sugar Co, will now be requested to intimate immediately the views of the Board since this question is pending for a long time

(37) Whether a reply has been received by Dr. A.V.V. If so what the decision of the Board

NOTE—Contn. Sheet

WD 01347—GPB—750—7-1-41

(38) Letter issued

24/6/41

JH

for orders.

23/6/41.

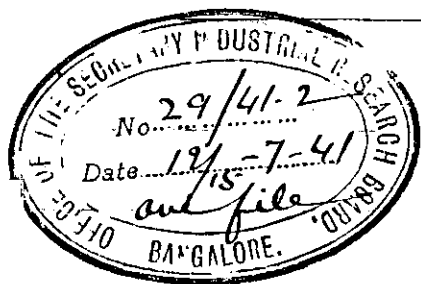
Lug

Immaculate

NOTE.

Subject Manufacture of potassium salts from
Molasses.

File No. of 19



-9-

39) The Board of I & C have also approved the the investigations and recommended the installation of a pilot plant at the Sugar Factory at Mandya or at the Industrial and Testing Laboratory for the manufacture of potash salts from molasses on an experimental scale as recommended by this Board. (vide proceedings put up). The chemistry of the proposition was also stated to be quite sound by Sir Martin Forster. Both Sir M.O. Forster and Dr.J.C. Ghosh recommended that after obtaining the results of pilot plant operations the proposition may be commercially exploited.

40) As per orders of the Chairman, the matter of conducting pilot plant operations was referred to the Chairman, Mysore Sugar Co, Ltd., in December last, to know whether the Company would finance the experiments and have them conducted at Mandya. (Para 11, Page 32 note sheet)

41) The Mysore Sugar Company who were in touch with Dr. Varadarajalingar have intimated that they have asked him to let them know to what extent he was prepared to share ^{with them the benefits arising out of} the results of experiments and that his reply is awaited.

NOTE.

Subject Manufacture of potassium salts from
molasses.

File No. of 19

-10-

42) In the meanwhile, Dr. Varadarajaiengar has forwarded a copy of his reply to the Sugar Co, re: the above vide his letter dated 30th June 41 put up herewith for perusal. The Company have not so far intimated their views to this office. They have been reminded again on the 11th July 1941.

43) From the correspondence between the Sugar Co, and Dr. Varadarajaiengar, it can be seen that the question of sharing the benefits, if any, that may arise when the results of experiments are commercially exploited seems to have taken precedence over the main issue of conducting the pilot plant operations.

44) It is now seven months since this matter was referred to the Mysore Sugar Company. The scarcity of supplies of potash salts and the high prices demanded - Rs360/- per ton for commercial quality potassium sulphate - necessitate a prompt and immediate investigation of the proposition. The Mysore Sugar Company have the advantage of an abundant supply of raw material - molasses - for the recovery a valuable chemical and good deal of valuable time is lost even in coming to a definite decision with regard to the conduct of experiments.

NOTE.

Subject Manufacture of potassium salts from
molasses.

File No. _____ of _____ 19____

- 11 -

45) It is for orders whether in view of the importance of the investigations Government ~~may~~ ^{may} ~~should~~ themselves not finance the pilot plant operations as recommended by the Board.

For favour orders.

Dated, 12th July 1941.

Secretary.

2.0 №. 96/41.2

29/8/41. 46)

2/7/8/91. 46) I have since discussed this with Dr. V.
Vice Chairman) The Sugar Company does not seem to be

Keen get the funds available for research a sum of \$5000
may be sent distributed as follows 3000 for equipment

1000 for special art work
1000 Home audio DV

See for chart maybe associated with DNV for the Commission
and an agreement on-air for him as the terms he has
already agreed. The Sugar company maybe expected to
give the ~~redaction~~ piece is at a nominal price. The NCC
may give the pamphlet air at their best price.

28. 8. 61

Chairman)

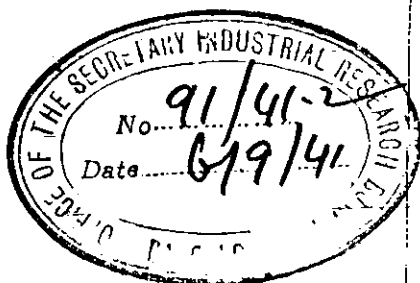
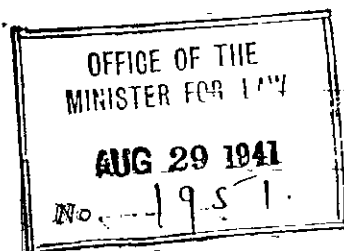
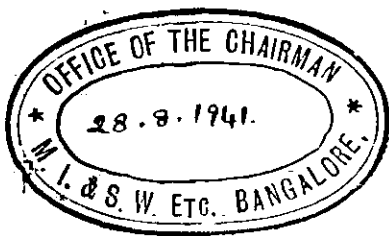
47) It is best that the interview the chairman of Mysore Paper Co's appoint & explain how he can make his profit more acceptable to the company.

Use Subject is deferred until then

48/ Dr. RVV may be intimates
(the file sub to RC)

Recd
 79
 669-

85
669



NOTE.

Subject

Manufacture of Potassium Salts -
from Molasses

File No.

of

19

-12-

49) Dr. A.V.V. intimates that he may kindly interview the Chairman of the Sugar Co. again, as minutes by the Chairman + intimate the result of his interview. Letter issued on 8/9/41

50) Letter from the Mys Sugar Co (Under No. B. 19/2081/6.9.41) was here on 8/9/41 intimating that the Board have resolved that the proposals are not acceptable to them is also for Perusal.

51) The Secy. Sugar Co. has also been ^{on 8.9.41} intimated in reply to his letter of the 6th that Dr A.V. has been requested to interview the Chairman of the Co. again.

52) Letters issued and the file is submitted for Perusal of V.C as per orders in Para 48.



53) 10/9/41. ⁵³⁾  (Vice Chairman)

10/9/41
10/9/41
10/9/41

NOTE.

Subject

Manufacture of Potassium Salts
from Rubenes.

File No.

61

19

55) Letter dated 26.9.41 from Dr. A.V.V. intimating that he had interviewed the Chairman, Sugar Co. on the 18th Sept. & that after his advice, he is forwarding modified proposals to the Company & that he would forward a copy of the same in a few days is for Perusal.

56) Further letter will be awaited
30/9/41.

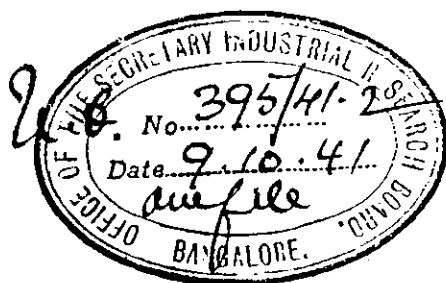
57) Seen by Secy. on 1/10/41

Dr. letter dated 2.10.41 from Dr. A.V.V. enclosing a copy of his proposals (as modified) forwarded to the Sugar Co. is for Perusal.

58) The previous proposals of Dr. A.V.V. (Flag 'G') is also for Perusal.

59) The starting of a new limited concern, in which the Sugar Co., M.C. & Mys. Govt. should subscribe at stake is another suggestion made by Dr. A.V.V. in his letter under reference.

60) Perhaps this may be considered



NOTE.

Subject

Manufacture of Potassium
Salts from brines

File No.

of

19

at the next Board meeting
Subtr

Jh

8/10/41.

Vice-Chairman

61)

Jh

Jh

SECRETARY.
BOARD OF INDUSTRIAL
PLANNING & COORDINATION
JAN 6 1942
No. *Jh*

Recd from V.C.

Jh 6/1/42

62) The file was received
from the V.C. on 6.1.42
for forward notes

Subtr

Jh

16/1/42

63)

Submitted

V.C.)

See 4)

Jh
17/1

SECRETARY.
BOARD OF INDUSTRIAL
PLANNING & COORDINATION
JAN 17 1942
U.O. No. 929/41. 2

SECRETARY.
BOARD OF INDUSTRIAL
PLANNING & COORDINATION
JUN 15 1942
No.

64) This file was received today
from the Office of the Chairman,
Mr. J. S. W. vide letter Subtr
separately

65) For perusal

Jh

15/6/42

-66) To 16/6

Manufacture of Potassium Salts

15// 67) Further work relating to this had been entrusted to the Govt. Dir. as per the decision of the Board. Dr. V. Gupar who is now working in I.T.C. in connection with the manufacture of cream of tartar is in close touch with the Govt. Dir. when the subject is the progress of work done about the cream of tartar was reported at the last meeting. The Govt. Dir. also mentioned that further work at Mandya was in progress. Hence no separate action now appears necessary on this file since the work is now reported to be in progress at Mandya. This subject is further work at Mandya - Refr of Potassium Salts is also on the agenda of the ensuing meeting. The Govt. Dir. has already been requested to kindly forward progress reports, which is awaited.

68) In pursuance of order

1/3
20/7/42

69) To
30.7.42

70) No reports have been received from the Govt. Dir. as yet. Perhaps the Secy. of the Mys Hydr. Co. may be addressed to intimate the present position. In order

71) To
4/10/42

1/3
1.10.42

72) Draft letter sent for attn

1/3
4/10/42

73) To
4/10/42

Done
No. D. 182/42-3, S. Co. 42

INDUSTRIAL
PLANNING AND COORDINATION.

General and Revenue
Secretariat

Manufacture of pyrethrum

156

File No.

of 194 .

[App. F. III-2

Serial
No.

NOV 5 1942

No. 3887

From the Secy. Mys Sugar Co.
Letter No. E. 19/3396, dated 10. 10. 42
(Received on 31. 10. 42)

Intimate that they have got ready
most of the equipment etc.

74) The report is for perusal.
It is also stated that the site for the
Plant has been fixed & that the roofing
of the shed is expected to be ready
completed in abt. 2 weeks' time
& that they would request Mr. V.
Iyengar to go to Mandya to
install the Plant & start working.
Further report may perhaps be
awaited.

75) In perusal.

4/11/42) Dec Secy)

Min. Law)

77) Dec
6/11

76)

WP

5/11/42

72
5/11

WP 6/11

72
6/11

78) For instructions, if this subject may
also be included in the agenda for the
next meeting and an up-to-date report

WD 3155-GPB-55,000-23-10-41

will be obtained from the Sugar Co. by that time
79) Please obtain a report first
23/11/42 Secy & Put up 23/11/42

NOTE—Cont. Sheet.

Some no. 28.353/42-3
5.12.42

Manufacture of calcium salts from molasses

File No.

of 194 .

General and Revenue
Secretariat

Serial
No.

Letter No. G 6/52480 dated 10.12.42 from
the Secy. Mys. Sugar Co.

81) Intimates that as suggested by Dr. V.
Sengar, the shed & other materials were
ready & that the works have intimated
him on the 18th Nov. to call at Mandya
to start putting up the Plant & the
works have not received any reply so far.
82) The Report is for perusal. If appd
Dr. V. Sengar will be apprised of the
fact & requested to take immediate
action. The Report, if appd, will ^{also} be
placed before the Board at the next
meeting for order

14/12/42 Dr. Secy

83) To
15/12/42

85) get details of work done
Please call for report
from Dr. A.V.V.

11/12
17/12

86) or final
Draft letter to Dr. V. Put up.

Also another D & P letter to the
Sugar Co put up for consideration

To
17/12

87) To
18/12 To Dr. A.V. Sengar
No. D.P. 399/18.12.42
To the Secy. Mys. Sugar Co.
No. D.P. 400/42-3, 18.12.42

Lead

Use of Potassium Salt for
Molasses

218,406

Continuation Sheet

File No.
Current No.

of

Page 8

88) Dr. A.V. V. Sengar has not submitted his report, in spite of reminder.
89) If appd, he will be asked to expedite his report.

H₃
30/5/43

90) To

16/6/43

91) Dr. S. S. Sengar

H₃
8/6/43

92) Free

18/6/43

L.P. 702/7.6.43

Letter No. 11 dated 11.6.43 from Dr. A.V. V. Sengar.

93) Dr. Sengar is now in Mandya & reports that the equipment for the Pilot Plant trial have been completed. The first batch of molasses has been treated with tamarind juice. Further report is awaited.

OFFICE OF THE MINISTER
FOR INDUSTRIES & SUPPLIES

JUN 26 1943

No. 1345

94) For perusal

Minister's
thru' Dir. Secy.

19/6/43

To
23.6.43

95) Co.
25/6

To
25/6

96) Under whose auspices, & on what terms is Dr. A.V. Sengar carrying on this work? Why have we not recd a detailed report of progress of any? Cannot we get one from the G.M. Sagar Co?

WD 1140-GPB-50,000-5-11-42

Has the process now been changed

Why? I did a ~~experiment~~ he tried at ITC re:
97/ What happened to the Cream of Tartaric
~~Hydro~~ Tartaric Acid? I wd like a report ^{on} this.

Is the work at Mandya connected with this work? If so why was it shifted to Mandya instead of getting the Molasses from Mandya to B'lore for the ~~open~~ trials?

98) Where are the opinions said to have been expressed by Dr Ghosh & Sir Martin Foster? I ~~do~~ am unable to find them (in the files) in the file.

99/ 4 Jan
Draft letter, signed

3/8/43

418

Lat. Sui. I.C.

cause for an up to date &
detailed report re: Cream of Tartar & Tartaric
Acid info at D.T.C.
Dy. 18/43. 44, 5. 8. 43

for at D.T. 18/43. 44, 5. 8. 43
Wp to Dr A.V.V. 2/4/44.

The 8. 11. 1893
 Cases for Reports re the work done on the
 2nd of 1893
 To Sir, Bryan C. B. Esq.
 16-11-93. S. E. 43

(101) The above subject was discussed in detail at the Board meeting held on 5.9.41. Kind reference is invited to Flag 'G'. It was finally decided at this meeting that Dr. V. Ganga should interview the Chairman of the Sugar Co. ^{modify his proposals +} try to make it acceptable to the Company. Accordingly Dr. V. Ganga ~~will~~ interview the Chairman of the Sugar Co. & place before the Co. his modified proposals. The Secy. Sugar Co. has intimated on 10.10.42 that Dr. V. Ganga paid 2 or 3 visits & that they are getting ready the equipment of a ^{small} engine by Dr. Ganga & that the Pilot Plant trials would soon commence.

(102) The work in this behalf is being done at the Sugar Co., Mandya, under the auspices of the Sugar Co. The terms agreed to between the Co. and Dr. Ganga are not available and if affd, the Secy. of the Co. will be asked to send a copy of these terms. Detailed up to date Progress Reports of work done have been called for and the same is awaited.

(103) The opinions of Sir M.O. Foster and Dr. T.C. Ghosh are in the file and they are tagged as 'S' & 'G'.

(104) With regard to the work done by Dr. Ganga, at the I.T.L., regarding the

Mannfische & Potassum Salz

J. P. 406, 23, 30, 31

Continuation Sheet.

D.P. File No.
Current No.

of

Page 22

Aug. '21

1089 Dr. W. Tyngar has explained that the Process regarding trial has not been changed in manufacturing the manufacture of Potassium Salts & has sent a copy of the blue print to follow the Process adopted by him. He has stated that in place of Pure Tartaric acid, the indigenous tamaris is employed to cheapen the initial cost. This letter explaining the details of the Process is for Perusal.

09) Dr. Dyenar has sent a further letter on 79 the ~~the~~ substituted ^(what diff) advance copy of his report on the work done at Mandya, sent by him to Mr G. M. J. N. S. P. S. The report for the Sect. J. N. S. P. S. is in the behalf is awaited. ^{It is stated that} The work is progressing immediately tartaric acid extract is secured, the further trials would start.

110) with regard to the Refs of cream &
tactant, at this I do not Dr. I say as I say
that, he understood the fact that
the principle of continuing this
work was not to let the new filler
be put in the chest which is the
case for is still a question. The
the new filler is for
penal. The fact is, may perhaps be able to read
the paper
pages 96-98 give notes.

John 6/9.

by the Sugar Co. is about Rs 3000/-
including recurring & non recurring charges
Mr. P. R. Balakrishnan (G. M.)
states that any further attempts to
recover the Potash Salts for molasses
may be made and if he can get
the tartaric acid for D.T. salt, where
he had processed green Tamarind
was successfully. If this is not possible
the G.M. states that the work may be
suspended. The Co. have stated
that the exps. have proved that costly
The Co. have sufficiently launched
into this & whether at this stage
without giving a final fair trial
to Dr. Iyengar ^{the Co.} draw back is
a point for consideration & orders.

117) With regard to the minutes of
the Minister at Para 97 of the notes,
a full report has been taken for
further G.O. D. I. C. & a reminder
has also been issued, to which the
G.O. D. has stated that he would
speed the report very early. These papers
along with relevant file will be
submitted separately, soon after
the report is received.

118) Refce: Paras 96 to 98. Minutes of the Min
& 113.

15/9

119) There are further references
I believe. Please put them
up to 6/10/63

Letter No. 21 dated 28. 9. 43 received
Dr. A. D. Dyer's forwarding copy of minutes
received by him from the Dy. Secy. Dy. Secy. Dy. Secy.

(10) 14/3/43 Dy. Secy. Dy. Secy. have informed Dr. A. D. Dyer
an amount of 2/9/- has been received
not been continued. Dr. Dyer has
advised the Dy. Secy. on 28/9/43 copy
of which has been received here. It is
not clear why the Dy. Secy. has
spent a substantial amount (about)
Rs 3000/- before knowing the decision
of the Board. I have informed Dr. A. D. Dyer
to stop further work. Subd.
for order.

121) A short note with ref.
to the minutes of the Minister
of 2/9/43 26. 9. 43 - is subd. as
per instructions & the file relating
to the manufacture of potassium
salts is linked for perusal
with order.

123) Typed short note continues
vide next page

122) Further notes
received. File
returned by the
Secy. for resubm.
with a further
note

15/11/43

24/11

~~SHORT NOTE.~~

Refce: Minutes of the Minister I & S on 3.8.1943. (Para 964
+++ 98)

124) The work relating to the manufacture of potassium salts from molasses is being ^{done} at Mandya, under the auspices of the Mysore Sugar Company. The expenditure involved is borne by the Company. The final terms agreed to between the Company and Dr.V.Iyengar are not available, and if ordered this will be called for. A report of the progress of work has since been obtained and is placed in the file for favour of perusal.

125) The scheme of Dr.Iyengar has been recommended both by Sir M.O.Forster and Sir J.C. Ghosh vide flags "S" & "T". The original idea was to have the trials conducted at the Industrial and Testing Laboratory. This was considered at a meeting of the Board and it was finally decided that it was best to have the work done by the Mysore Sugar Coy. at Mandya, who were interested in this. The Mysore Sugar Coy., have taken up the trials and have spent about Rs.3000/- so far. They have all on a sudden written to Dr.Iyengar on 23/9/43, that they do not propose to continue the trials and have also reported to the Board that this work would be suspended. It does not appear to be fair that the Company should have stopped the investigations at this stage, without knowing the final results and without obtaining the views of this Board. The note of the General Manager, Mysore Sugar Company is for perusal. The investigation appears worth giving a further trial in view of the opinions expressed by Sir.M.O.Forster and Sir J.C. Ghosh.

126) Work relating to the manufacture of cream of tartar was taken up at the Industrial and Testing Laboratory. About 400 lbs. of cream of tartar have been produced during the last season. Kind reference is invited to para's 33-47 ^{of the notes} in the linked I.P.file. Proposals for the continuance of the work or otherwise during the current season have not yet

been received from the Government Director, Industrial Concerns. As ordered this subject (Manufacture of cream of tartar - linked file) is on the agenda of the next meeting. The report from the Government Director is awaited. Submitted for perusal and orders.

127) Refce: Para's 96 - 98 of the notes.

Minister IHS)
Thro' Dev Secy)

24.11.43

128) The Company has suspended its work because they feel that Dr. V. Lyngby is wasting time & money by trying to get tartaric acid from ripe tamarind - a flawed distillation process. (Vide enclosure to P.O.S.)

Min. IHS)

27/11

28.11

129) I want to ask this question when I was at Mandya yesterday - Dr A.V. was present. The matter was discussed with the chm & the G.M. yesterday.

The Sugar Co. has now been decided that ~~the~~ will arrange to obtain a quantity of tartaric acid from the I.T.L. where it is being made. (instead of trying to make it from ripe tamarind at Mandya) and that hereafter Dr A.V. will be given this job for demonstrating within his process of extraction of potash from molasses at Mandya.

2 weeks ago

130) He will also satisfy the Co authorities

that the ^{melanes} Lignin: after extraction of the potash -
will be still be quite suitable for fermentation
into alcohol - Action is being taken on these lines
by the C.I. & D. A.V.V. -

Further report from the CO
may be awaited.

6/12/43
Ca
7/11
7/12

131/ So far no report has been received
from the Sagar Co. May a letter be
sent up to the future for order
6/1/1944

132/ Yes
133/ After letter sent
134/ Yes
135/ Yes
136/ Yes
137/ Yes
138/ Yes
139/ Yes
140/ Yes
141/ Yes
142/ Yes
143/ Yes
144/ Yes
145/ Yes
146/ Yes
147/ Yes
148/ Yes
149/ Yes
150/ Yes
151/ Yes
152/ Yes
153/ Yes
154/ Yes
155/ Yes
156/ Yes
157/ Yes
158/ Yes
159/ Yes
160/ Yes
161/ Yes
162/ Yes
163/ Yes
164/ Yes
165/ Yes
166/ Yes
167/ Yes
168/ Yes
169/ Yes
170/ Yes
171/ Yes
172/ Yes
173/ Yes
174/ Yes
175/ Yes
176/ Yes
177/ Yes
178/ Yes
179/ Yes
180/ Yes
181/ Yes
182/ Yes
183/ Yes
184/ Yes
185/ Yes
186/ Yes
187/ Yes
188/ Yes
189/ Yes
190/ Yes
191/ Yes
192/ Yes
193/ Yes
194/ Yes
195/ Yes
196/ Yes
197/ Yes
198/ Yes
199/ Yes
200/ Yes

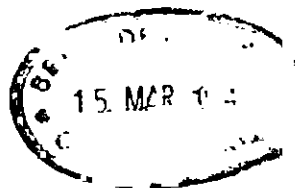
J.P. 191/43-44, 187/1/44.
192/43-44

131/ No reply has been received.
D.V. & D. remainder. please
132/ Yes
133/ Yes
134/ Yes
135/ Yes
136/ Yes
137/ Yes
138/ Yes
139/ Yes
140/ Yes
141/ Yes
142/ Yes
143/ Yes
144/ Yes
145/ Yes
146/ Yes
147/ Yes
148/ Yes
149/ Yes
150/ Yes
151/ Yes
152/ Yes
153/ Yes
154/ Yes
155/ Yes
156/ Yes
157/ Yes
158/ Yes
159/ Yes
160/ Yes
161/ Yes
162/ Yes
163/ Yes
164/ Yes
165/ Yes
166/ Yes
167/ Yes
168/ Yes
169/ Yes
170/ Yes
171/ Yes
172/ Yes
173/ Yes
174/ Yes
175/ Yes
176/ Yes
177/ Yes
178/ Yes
179/ Yes
180/ Yes
181/ Yes
182/ Yes
183/ Yes
184/ Yes
185/ Yes
186/ Yes
187/ Yes
188/ Yes
189/ Yes
190/ Yes
191/ Yes
192/ Yes
193/ Yes
194/ Yes
195/ Yes
196/ Yes
197/ Yes
198/ Yes
199/ Yes
200/ Yes

Letter No. 6-19/7571 of 14.3.44
from the Sec. Mr. Ryan C.I. Station

that the exp^t would be undertaken by
abt the 22nd of the month

(37) The G. M. of the Sugar Co.
has stated that 200 lbs of
Calcium Tartrate required by
Dr. V has been rec^d for an
I. T. L. The Sugar Co. have
addressed Dr. V. to come over
to Chaudhry's Rest^o at
exp^t. It is promised
to be started for an 22nd
In this report will be awaited.



Ref: Para 129 & 130.
138 Snded for perusal.

Minister D48
This Des Sup

139.

22/3

28/3

OFFICE OF THE MINISTER
FOR INDUSTRIES & SUPPLIES

MAR 23 1944

No. 5719

142

Off reminder to Sugar Co.

143

28/3 21-4-44

Letter no. E. 19/8752 of 27.4.44 from
the Secy. Mr. Ryan Col. stating that
Dr. V. Lyengar has restarted the work &
that a detailed report with samples are
expected in a few days.

144. The interim report is for Penseeal.
The detailed report of Dr. V. with samples
will be awaited.

1/5/44

145

45/44

146, No report has been

147. 5 & 7 been submitted.

22/6

148. 1/6

D.P. 410/43-44, 22/6/44

Letter no. E. 19.10256 of 24/6/44 from
Secy. Mr. Ryan Col. forwarding a copy of
the reply of Dr. A.V.

9) The reply of Dr. A.V. is for Penseeal.
(It is not clear why this is so.)

Ref: Para 140.

27/6/44

150

27/6/44

P. 108. D. 9.9.44.

151 No report has been recd. so far.
It has been for atb.

27/6

152

27/6/44

D.P. 146/5.10.44

10/9/44

Manufacture of Potassium Sulfate

Continuation Sheet.

File No.

53 / 40.

Current No.

of

H.P. 278,

Page.

90

Letter No. 8.19/3403 dated 20th October 1944
from the Secy. Dept. Sugar Coll., forwarding
a copy of the report of Dr. V. S. Sengupta.
153 The Secy says that the experiments
have not proved ^{to be} as successful as
might be expected. He is of the
opinion that no useful purpose would
be served by continuing the experiments.
154 The file may be sent to the
Tech Secy for remarks. In order to

~~Called for~~
14/11 155 The Tech Secy (Dr Rao)
has suggested in another connection
that this item may be deleted from
the list of the subjects on the programme
of the B.S. & R.

156 Sd/- for perusal orders
with refer to paras 129 & 130 supra

157 New Secy) To 5/12/44
A. S. Sengupta
7/12/44

Letter dated 28/3/45 from Dr. K. V.
Varadachari to the Secy. B.S. & R.
re his investigations Pot. salt.

158 The points raised in the
letter of Dr. V. are as under.

- (1) To give an opportunity to
discuss the results obtained in
the Hydrabad coll. before a recommendation
decision is taken on the
part of the Govt.

2) Re the payments due to him from the Sugar Co. & agents that the balance of Rs ~~3000~~ 3000 may be ordered to be paid to him

159 Orders have not yet been passed. The flow sheet submitted by Dr H. N. Rao refers to the para 155-157. This is separately dealt with. Even though it is ordered that this subject may be deleted from the programme of the B. S. I. R., orders are necessary re. the continuation of the investigation or otherwise & the payment to Dr. V.

160 The Sugar Co. having spent some money over this have now stated that there is 'no use in pursuing' this matter. At the same time they have not definitely stated that the bulls are not a complete success. The proposal of the Co. is for orders

Re: the payment due to Dr. V. The Chairman has definitely replied to Dr V on 25/11/44 that nothing more could be done. The Sugar Co. will be asked if

appd to forward the terms of
engagement with the Securus of the /A
Board.

161 Sells for orders

162 A. may be done.

30/4/163 The Technical Secy of the BSR
has suggested the dropping of this
item from the list of investigations. The
Engar Co also do not want this work to
be continued further. The question may
perhaps be dropped.

164

Dev Secy)

6/6/45

A. yes Co.

165 Dft letter note

166. Rep 2/17

7/17
D 486 16.7.45

To the Secy, Mysore sugar Co,
request him to forward a copy of the
agreement up to any or the terms on which
Dr. Varadarajapur's services were
engaged.

At for 7 fol. salts per 2000.

J.P. 53/40

5933, $\frac{517}{94}$

Letter no. 489/dated 16.7.45 for the
Secy. Mys. Ryar Coll forwarding a
copy of the terms of estm. of the Board
on their subject

The letter of Dr. V dated $\frac{20}{21}$. 2.1942 in which
details of cost sheet for the work has been
further, has been taken as the basis
of the Resolution of the Board ^{of Mys. Ryar Coll.} ~~which have~~
The Board has sanctioned ^{of Mys. Ryar Coll.} this proposal
which has been estimated to cost
Rs 5000. It is also stated in the
estm. that the sheet be further
examined by Mr. S.B. Dasg + Mr. P.R.
Balakrishnan. In the cost sheet
a sum of Rs. 600/- has been provided for
allowance to Dr. V. The decision of the
Board to pay Dr. V a month of the
claim - Rs 300/- is not clear.

The report of Dr. V has to be perhaps
examined by a Technical officer to enable
to know whether the work has ^{at least} been
fairly successful thereby it would facilitate

to take a decision re: the continuation of
the work or ^{otherwise} (2) Payment of the allowance
to Dr. V.

168 The Pilot Plant Trials ^{+ proposal} of Dr. V. has
been ^{were} examined & recommended by

Manufacture of Potassium Salts from Molasses.

J.P. 53/400.

5933, 517
JK

Sir J.C. Ghosh vide Flag 'M'

~~of the Scheme~~

Since this Scheme has been under
the consideration of Govt. since 1940:

as it has been recommended by

Sir J.C. Ghosh & Sir M.O. Forster,

it is perhaps fair to refer the

Report of Dr. V. to Sir J.C. Ghosh (a member of
our B.S.O.R.)

for opinion on the performance

& the desirability of continuing it or

otherwise. This is for reconsideration

order. Subtr for order.

JK

6/8/45 - 169

A scheme submitted by Dr. Varadarajaiengar
of the Indian Institute of Science
for conducting pilot plant trials for the extraction of

potassium salts from molasses has been under the consideration

of Government since 1940. This scheme was recommended both

by Sir J.C. Ghosh and Sir M.O. Forster (vide para 39 of notes).

The Mysore Sugar Company was therefore asked to get themselves

interested in this so that the waste material could be utilized

with advantage. After protracted correspondence, the Company

agreed to finance the experiments ^{and} have the trials conducted

at their Factory at Mandya. The investigations have been

conducted by Dr. Varadarajaiengar and he has furnished a report*

(170) For reasons explained in their letter of 20th Octr. 1944

the Sugar Company say that there is no use in continuing the

experiments and that they propose to suspend the work. They

have also intimated this decision to Dr. Varadarajaiengar, who

has protested to Government for a decision both re: (1) the

(with urgent
case)

(Reed back
from A/s with
instr - note
to be put up
JK
10/8/45)

Flag '24'
'8'

Manufacture of Potassium salts from molasses.

General and Revenue
Secretariat

517/I&C

I.P. File No. 53/40

of 194

[App. F. III-2]

Serial
No.

the continuance of the experiments (2) the payment of allowance due to him for the work done. These are dealt with below.

171)

Continuance of the experiments. The Sugar Company have spent a sum of Rs. 3000/- or so on this investigation which has been taken up under the directions of the Board of Scientific and Industrial Research and Government. ~~Sir~~ Dr. Varadarajaiengar says in his report that the experiments conducted by him have been successful. But according to the review of the General Manager, Sugar Company, the experiments are stated to be not as successful as might be expected and that the experiments were on a laboratory scale and not worthwhile being taken up for adoption on a commercial scale. While contesting this, Dr. Varadarajaiengar in his letter dated the 28th March 1945 requests that it is only fair that he should be given an opportunity to meet the points raised by the Sugar Company.

172)

The Council of Scientific and Industrial Research (Delhi) have also published a non technical note on the same subject. Whether this is different from the process adopted by Dr. Varadarajaiengar is not clear.

In the circumstances, it is perhaps desirable that the report of Dr. Varadarajaiengar should be examined by an independent scientist. The report and the review of the Sugar Company thereon may therefore be got examined by Sir J.C. Ghosh, (now Chairman, Board of Scientific & Industrial Research) who may be requested to state whether it is worthwhile pursuing the experiments further or whether they may be dropped.

173)

Remuneration to Dr. Varadarajaiengar.

The Mysore Sugar Company have taken the letter of the 21st February 1942 of Dr. Varadarajaiengar containing the details of the expenditure as the basis for the

Flag T

A

Manufacture of potassium salts from molasses.

File No. I.P. 53/40

of 194

517 / Mr. General and Revenue
Secretariat

Serial
No.

trials and have resolved that an expenditure of Rs.5000/- be incurred for the purpose. This sum includes the allowance of Rs.600/- to Dr.Varadarajaiengar, which he has provided in the estimates of cost ~~xxxx~~ vide letter^x referred to above. There is no specific stipulation in the resolution of the Board to the effect that if the experiments are unsuccessful, there would be a proportionate reduction or otherwise in the payment of the allowance.

'B'

174) The sugar Company have made a payment of Rs.300/- only to Dr.Varadarajaiengar on the ground that the experiments did not prove successful. Experiments in their very nature cannot be said to end always in success. The final decision of the Chairman of the Company - was intimated to Dr.Varadarajaiengar - that there are no grounds for reconsideration for the payment of the balance of Rs.300/- due to him does not appear to be justifiable. Since the letter of 21.2.1942 of Dr.V.Iyengar has been taken as the basis for the resolution of the Board (vide Flag 'B') it has to be taken that this forms practically an agreement and there is a binding on the part of the Company to pay the full allowance of Rs.600/- to Dr.V.Iengar which amount is provided for in the estimate and approved by the Board. The Sugar Company may therefore be asked to pay the balance of Rs.300/- due to Dr.Varadarajaiengar.

'B'

175) Submitted for orders.

Dev Secy

176

To 27.8.45

(Eay cas)

177 *As regards continuance or not of the experiments, it is for 172 above may be approved.*

177 *As regards Dr. V's remuneration, the Chairman of the Sugar Company may be asked to place the matter before the Board, giving an opportunity*

(Manufacture of Potassium salts)

General and Revenue
Secretariat

File No. *J.P. 53*

of 194 O.

517

[App. F. III-2]

Serial
No.

*to Dr. V. to present his case, & come to a
decision on the matter*

(Min. P. 41)

178

Ca 21/8

21/8

Rs. 5 $\frac{9}{16}$ US.

Ca 5/9

179 *Off letter to Chairman, Syon Co.
Subtr. for notes if this may be —
indicated to Dr. V. with refer to letter
to Govt. praying for a decision.*

A

*180. After issue, the file may perhaps
refer to ~~the~~ Sri J.C. Ghosh, as ordered,
or the original report of Dr. V. will
be sent to him for expert opinion
for orders.*

B

181 A. Yes.

7/9/45 *182 B Not necessary. The necessary
papers may be sent with
a covering letter.*

Due letter to Mr. Syon Co

To

187 9/11/45

*Do. The Ch...
- says*

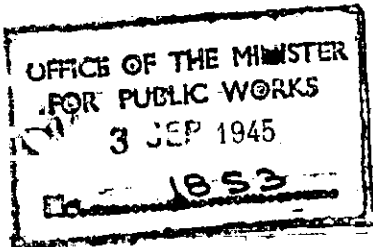
*to exp. Com. his case
Borex & an in
to*

183

Two off letters sub

12/10

*184 Due oversup signature
To 12/10/45*



Agent C-0
NOTE—Contn. Sheet.

Serial
No.

D 2485 Dr Varadarajaper
19.10.45 States that matter
has been referred to the
Chairman, M.S. Co. and
requests him to get in touch
with him & come to a
decision

D 2486 Sri J.C. Ghosh
19.10.45 Forwards the
original papers re. the
investigation for his
remarks

185 Dhr. Jai letter returning
the original letter of Dr. V. put
up as per wishes.

By
30/10

186 J.C. Ghosh
30/10/45

D 3276 Dr. A.V. Varadharajaper
1.11.45 Returns the Original Correspondence
and requests him to acknowledge
its receipt.

Note dated 29-10-45 from Sri J.C.
Ghosh stating that no useful
purpose would be served by continuing
the exps-

187 The papers have been examined

Serial
No.

by Sri J. C. Ghosh. He is of the
opinion that no useful purpose
would be served by continuing the
experiments. In the circumstances the
proposal of the Sugar Co. may
have to be accepted. ~~the~~
~~can~~ only for order.

188 The proposal of the Sugar
Co. to ~~stop~~ ^{stop} further the continuation
of the experiments may be accepted.
189. Further report of the Co.

re the remuneration to be paid to
Dr. Varadarajapur may be awaited.

Dev Secy

Mem. P. V. V.)

191 20/11/45
Ca
21/11

190 8.11.45
Ca
18/11
29/11

192 Dgt Secy Subt -
30/11/45
193 Dgt Secy
4/12/45
24/11 5.12.45

Secy, Mys Sugar Co. Ltd

conveys the approval of Govt
to the proposal to stop the continuation
of the experiment on Manufacture of potassium
salts and request him to expedite
the settlement of Dr. A. V. V's
final accounts and report

File No. JP 53/ceo

of 194 .

General and Revenue
Secretariat

Serial
No.

Letter no. 3892 dated 5/12/45 from the
Secy. Mys Sugar Company Ltd intimating
the order of the Board re the payment
of remuneration to

94 It is stated that the Company has
~~already~~ paid a sum of Rs 664/-
on account of T. A and Rs 300/-
as allowance (in all Rs 964/-)
as against Rs 600/- provided in
the budget sent by Dr. V. The
Company have also made it
clear that there is no case
for reconsideration. In the
budget, there appears to be
no separate provision for T. A &
in the circumstances, there appears
to be no use in pursuing the
question any further, particularly
in view of the final decision
taken to stop the continuance
of the exp't. The order of the
Board may therefore be approved
& the party suitably endorsed
Submitted for orders.

Dev Secy) To 17/12/45

11/12/45 Dr. V. may be informed of the
resolution of the Board & that the matter
may be dealt with matter by Govt

(U. P. S.)

17/12/45

OFFICE OF THE SECRETARY
FOR PUBLIC WORKS
16 JAN. 1946
No. 5108--

Serial
No.

Dft letter subto

22/1/46

25/1/46

22/1

D 5684
4.2.46

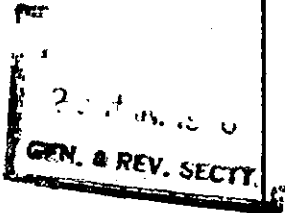
Dr. A.V.V. Iyengar.

States that in the

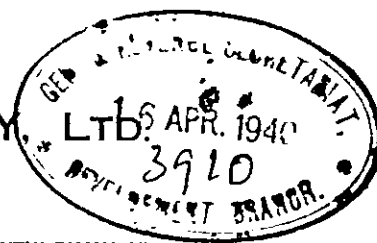
circumstances explained; for
consider that nothing more
could be done in the matter.

D 5685
4.2.46

Memo to Secretary,
Mysore Sugar Co. Ltd



B
9/1

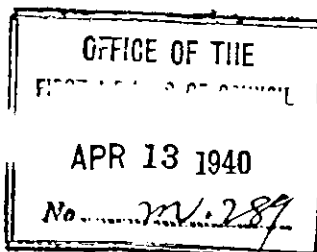


THE MYSORE SUGAR COMPANY

LTD. 15 APR. 1940
3910
DEVELOPMENT BRANCH

RAJAMANTRAPRAVINA DIWAN BAHADUR

K. MATTHAN
CHAIRMAN



"SANTHI BHAVAN"
SESHADRI ROAD
BANGALORE

11th April 1940.

Dear Mr. Madhava Rau,

You may recollect that in August last, I wrote to you about a scheme forwarded by Dr. Varadaraja Iyengar for the extraction of potash from molasses. You wrote to me on the 7th idem that you would refer the papers to Mr. S.G. Sastry and in case it was found possible for the Board of Industries & Commerce to pursue the matter you would let me know. Subsequently, I had a letter from the Development Secretary, dated 29th December 1939, suggesting that Dr. Varadaraja Iyengar may be given facilities to try his process on a factory scale, with a view to finding out what the margin of profit would be.

I have told Dr. Varadaraja Iyengar that I shall be glad to give him any reasonable assistance for trying the thing on a factory or preferably on a semi-factory scale, that is to say, I would let him have about 100 tons of molasses free. To try it on a factory or even semi-factory scale, in the Sugar Factory, would be ~~an~~ exceedingly difficult and certainly very expensive, because his proposal is to interpose a rather complicated process in the middle of the process of manufacture of alcohol after the stage in which the molasses is dissolved and clarified and before it goes to the fermentation vat.

I suggest that if the matter is to be pursued further, it may be referred to the newly constituted Central Industrial Research Board. I am enclosing the connected papers.

Yours sincerely,

K. Matthan

15/4/40
[Signature]

Rajamanthrapravina
N. Madhava Rau, B.A., B.L.,
Member of Council,
B a n g a l o r e.

GPK.
Encls.

A. V. VARADACHARI, B.A., D.Sc., A.I.C.
BIOCHEMIST.

Indian Institute of Science,
Bangalore.

Ref:

Date 4th May 1940.

Rajamantrapravina^{awl} Madhava Rao, B.A., B.L.,
First Member of Council,
Bangalore.

Dear Sir,

I have pleasure in enclosing herewith, for your kind consideration, a note on the UTILISATION OF MOLASSES FOR THE PRODUCTION OF POTASSIC SALT containing besides, summarised details of a pilot plant for treating five cwts. of this crude material per day.

In submitting this note, I wish to mention that the total cost of the plant and of chemicals required, may not exceed in my estimate Rs. 500. I would however take particular care to see that money is not wasted in getting unnecessary and avoidable equipments. I would be happy to submit the vouchers for all purchases made to order, or obtained otherwise for cash, ^{when} ~~if~~ I am required to undertake this demonstration.

It is however possible to secure some of the ordinary equipments the demonstration is planned either at the Mandya Sugar Factory or at this Institute or at the Industrial & Testing Laboratory, where normal facilities for such work already exist. It may also be possible to loan out from one or other of these institutions such equipments as may be conveniently spared by them for a temporary period. I am willing to work in any of these places.

I expect that a period of three months will be required to demonstrate to the Government details of the process indicated in the enclosed note.

I hope that the Government would be willing to allow me a lumpsum of Rs. 1200/- during the period of this undertaking.

With kindest regards,

Yours very sincerely,

This letter was given to
the by the Member
AVV/KR. on 6.5.40.
\$ 6/5.

A. Venkatarao Tiyem

A NOTE ON THE RECOVERY OF POTASSIUM FROM MOLASSES AND
THE MANUFACTURE OF POTASSIUM SALTS FROM THIS RECOVERED MATERIAL

It has been ascertained that potassium present in molasses ~~xx~~ can be precipitated almost entirely as cream of tartar on the addition of equivalent quantities of tartaric acid in the form of tamarind juice to the ~~saccharine~~^{h/} raw material. This precipitate is purified and worked up to produce different potassic ~~xxxx~~ compounds. The lime tartrate secured as a by-product in this process serves after reaction with sulphuric acid, either to treat further quantities of molasses in place of the tamarind juice or even as a source for tartaric acid.

In the present instance, it is intended to set up a pilot plant for treating 5 cwts. of crude molasses per day, employing an aqueous extract from the pulp of the ripe tamarind fruits, ^(the absence) in ~~xxxx~~ of the green ones. The purified cream of tartar from each day's production will be treated to manufacture different potassium salts.

The process can be summarised under the following three main heads:

- A. The precipitation of potash in clarified molasses as cream of tartar through the addition of tamarind juice.
- B. Preparation of potassic salts from the purified cream of tartar.
- C. Tartaric acid extract manufacture for treating further quantities of molasses.

Further elaboration of these items is made below indicating the equipments required for running the pilot plant operation.

Elaboration of details for the pilot plant operation of a process for the separation of potassium from molasses and the manufacture of potash salts from this source.

A. PRECIPITATION OF POTASH AS CREAM OF TARTAR FROM DILUTED CLARIFIED MOLASSES BY TREATMENT WITH AN AQUEOUS EXTRACT CONTAINING TARTARIC ACID.

This entails three operations.

I. Dilution of molasses with water and clarification of the same.

The equipment for diluting molasses does not demand materials of special construction and can be made up from drums of 45 gals. capacity (used for storing oils etc.). The clarification of the diluted molasses is effected by decantation, for which no special arrangement is necessary. Such of the materials as are available will be made use of.

II. Precipitation of cream of tartar from diluted molasses.

The clarified molasses from the above (representing 5 cwts. of the original material) is treated with an aqueous extract of tamarind (its tartaric acid content being previously ascertained) in equivalent quantities.

This operation will be carried out in stoneware vessels of 40 cft capacity, 4 of them ~~me~~ being required.

III. Recovery of cream of tartar.

This is readily effected by decanting the above solution. The last portions are conveniently removed through a Taylor bag and washed with cold water, the molasses being collected separately in a container along with the wash water.

The equipment for this includes bag filters, containers for filtered molasses, these being wooden barrels of 40 gals. capacity, half a dozen of them being useful

B. MANUFACTURE OF POTASSIUM SALTS FROM CREAM OF TARTAR AFTER ITS FURTHER PURIFICATION.

This process involves again three operations, viz., purification of cream of tartar, treatment of cream of tartar ^{directly} with salts such as sodium carbonate, antimony oxide etc., to produce valuable medicinal chemicals, and finally neutralising the bitartrate of potash with calcium carbonate and converting the resulting neutral potassium tartrate into other potassic salts such as sulphate, chloride etc. and securing them as ~~witts~~ solids.

I. Purification of cream of tartar.

The recovered cream of tartar is further purified by extraction with cold or hot water depending upon the intensity of the colour of the precipitated material.

The equipment for this would include enameled or ^{stain}~~stain~~less steel vessels.

The country's requirements are estimated annually at 5 tons.

II. Direct treatment of cream of tartar for the manufacture of potassic salts of value in curative medicine.

(a). Treatment with sodium carbonate.

This reaction results in the production of Rochelle salt.

Every 10.5 lbs. of cream of tartar require 3.0 lbs. of anhydrous sodium carbonate for neutralisation and the resulting solution evaporated to secure the solid. The yield from 50 lbs. amounts in practice to 65 lbs. of the final product.

(b). Treatment with antimony oxide.

One obtains in this manner tartar emetic used in medicine.

Every 10 lbs. of cream of tartar are heated with 8 lbs. antimony oxide in a [/]stainless steel basin, with distilled water till dissolution is complete. On evaporating the solution, the pure [/]salt ~~s~~ crystallises out. 50 lbs. of cream of tartar yield nearly 75 lbs. of this ~~at~~ salt.

III. Neutralisation of cream of tartar and subsequent treatment
treatment with lime salts.

50 lbs. of cream of tartar require for neutralisation 27 lbs. of 100% CaCO_3 (limestone).

The neutralised solution requires 18.5 lbs. of CaSO_4 (anhyd.) and yields 23.1 lbs. of K_2SO_4 in solution.

or requires 14.6 lbs. of anhyd. CaCl_2 to yield 19.8 lbs. KCl in solution;

or requires 9.8 lbs. of $\text{Ca}(\text{OH})_2$ to yield 14.7 lbs. of KOH in solution; or 18.1 lbs. of K_2CO_3 in solution.

XXXXX

The yield in each case, of calcium tartrate amounts to nearly 50 lbs.

This neutralisation of cream of tartar followed by other reaction is carried out in enamelled vessels. *The solids held in solution will be evaporated.*

C. SOURCES OF TARTARIC ACID FOR TREATING MOLASSES.

In the economy of the above process, the sources of tartaric acid extract for treating molasses are twofold: primarily, the tamarind fruits and secondly the lime tartrate.

(a). Tartaric acid extract from tamarind fruits.

The production of this extract from the pulp of the ripe fruit will be carried out with about 10 cwts. of the same for each extraction, in specially constructed leadlined cast iron containers. The aqueous extract is clarified by boiling and concentrated to a small volume, in the same vessel suitably modified for the purpose.

(b). Tartaric acid extract from lime tartrate.

The lime tartrate secured above is treated with sulphuric acid, and the resulting extract suitably concentrated in the leadlined apparatus mentioned above, after separating the calcium sulphate.

The equipment for this treatment consists of a leadlined wooden vat provided with steam coil etc. This vat contains modifications to serve for filtering the calcium sulphate.

SPECIAL APPARATUS REQUIRED FOR THE ABOVE OPERATIONS.

Leadlined cast iron apparatus of special design for extracting tartaric acid from tamarind fruits and concentrating the extract.

Leadlined wooden vat provided with steam coils etc. for treating lime tartrate.

Stainless steel vessels (enamelled ones will be used if available) 5 gallons capacity.

Stoneware containers capacity 40 cft. 4 of them may be needed.

Special chemicals.

Calcium carbonate.
Calcium chloride.
Sodium carbonate.
Antimony oxide.
Sulphuric acid.
Calcium oxide.

The cost of these equipments may not exceed 5750 Rs.

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The Industrial Utilisation of Molasses

By A. V. VARADARAJA IYENGAR, B. A., D. Sc., A. I. C., A. I. I. Sc.,
Department of Biochemistry, Indian Institute of Science, Bangalore.

THE SCHOLAR PRESS,
PALGHAT

The Industrial Utilisation of Molasses

By A. V. VARADARAJA IYENGAR, B. A., D. Sc., A. I. C., A. I. I. Sc.,
Department of Biochemistry, Indian Institute of Science, Bangalore.



MOLASSES originates from raw sugar juice and represents the residue resulting from the separation of cane sugar from the concentrated juice either from sugarcane grown throughout the country, or from beet in the Punjab, and from the palmyrah palm (*Borassus flabelliformis*) found on the Coasts. The quantity of molasses obtained is very large indeed, and with the cumulative production of sugar for the last few years, it has become an acute problem to find use for the same, nay even to dispose it of. According to a recent forecast, the production of molasses for the year 1936—37, has been unofficially reckoned at 600,000 tons, and the total for all the years will thus easily run up to a few million tons even according to official published figures.

Production of molasses in India. (In 1000 tons)

Year	From Cane	From Sugar Refinery	Total
1931—32	69	46	365
1932—33	130	56	461
1933—34	190	40	430
1934—35	234	22	406
1935—36	337	33	495
1936—37	406	19	550

The progressively high rate of production from sugarcane is worth recording. Further, these figures do not take count of molasses derived from other sources such as the cocoanut and other palms. The adequate utilisation of this commodity is thus a problem of prime importance to India even at this stage. Apart from the fact that a few thousand tons may find application in crude confectionery etc., the quantity still to be disposed of has reached an abnormal figure indeed.

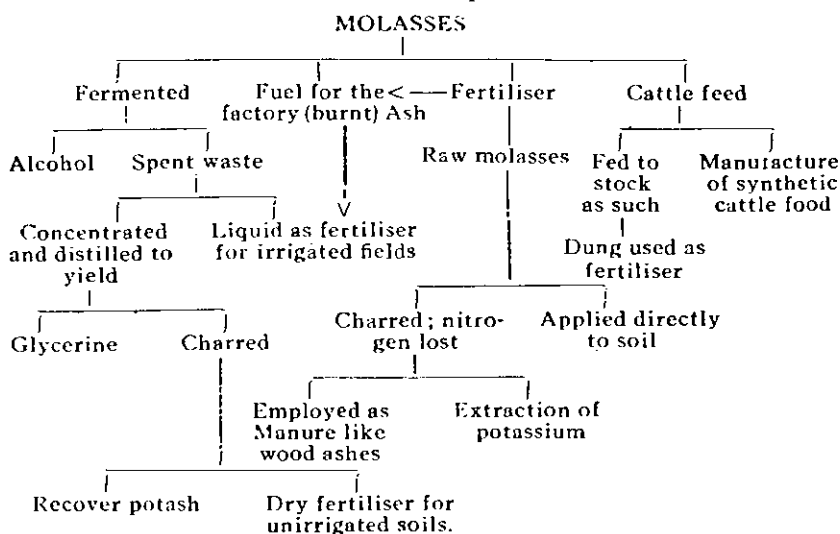
Molasses obtained from sugar factories and refineries is very highly viscous with the result that it presents

considerable difficulty in transferring it into barrels and other containers. The question of storage of this product, therefore presents such extraordinary features to the manufacturer that he is prepared to throw it away instead of incurring expenses for preserving the same. Lest he should render the surroundings insanitary by careless discards of this product, the manufacturer has stored it up under some hazard of explosion, in the hope that it would fetch him money some day. From the point of conveniently transporting molasses, attempts have been made to incorporate it with wheat *blusa*, rice straw etc. in order to convert it into a solid product (condition), but have not been successful. Further investigations carried out recently in this Department were encouraging to the extent that the disturbing moisture has been completely eliminated. The difficulty experienced in transporting molasses has in a way been solved. While the combined molasses can be used as a good fertiliser, it possesses some unwholesome features for application as cattle-feed etc. Moreover, it does by no means solve the disposal of the immense quantity of molasses which has somehow to be got rid off.

The difficulty for this is not far to seek. It lies in our ignorance of the composition of the final product and arises partly also from a paucity of scientific information on those factors which influence the inhibition of sucrose crystallisation from molasses. It is well known that molasses contains about 15–20% moisture, 8–10% mineral matter, about 40% cane sugar, about 30% reducing sugars as glucose, and a very negligible amount of nitrogen. In the case of beets, the reducing sugars are small, while sucrose and potash contents are very high. There is practically no information on the quantity of nonsugars present in these. Besides, molasses has a highly astringent taste combined with some bitterness which is believed to be due to the potassium occurring in it. Nothing is known regarding the nature of the potassium compound which adds to this bitter taste. To what extent the sodium salts present in the molasses contribute to this disagreeable taste is still obscure. Again the highly unsatisfactory colour of molasses

is a feature which demands close study. Besides caramel which arises in the process of concentrating any sugar solution, the presence of saccharetin is chiefly responsible for this undesirable characteristic of the molasses. It is known that the colour of molasses becomes light and bright when treated with acids, while in the neutral or alkaline state, it assumes quite a dark tint. It is therefore essential that a more detailed examination of molasses should be made of the tannins, organic acids etc. present in it, since in the author's experiences these have been found to contribute largely to the defects noticed above.

The following scheme will represent the several uses to which the molasses has been put.



Fermentation of molasses. In view of the richness of molasses particularly in carbohydrates, attempts have been made either to recover the sugars present or utilise them adequately. Thus for instance, the manufacture of alcohol from molasses has been recommended. It is indeed difficult to assert that the production of alcohol is the surest and most profitable way of utilising the molasses. The question of power alcohol in place of petrol is also a complicated one. While the petrol engine can be made to function with alcohol, the efficiency factor does not appear to have been adequately studied. Moreover, it is doubtful whether the excise duty from alcohol can make good

the loss in revenue to the Government due to decline in petrol consumption. The possibility of an admixture of petrol with alcohol to the extent of 20% as is practised in other countries has to be investigated under varying conditions of Indian climate. But from the general point of view, it does not solve the problem on hand completely, besides being attended with considerable danger (from the prohibition view point) and expense (from the excise control point of view). From the fermentation aspect, what is of more significance relates to the fact that sugars in molasses form the most suitable raw materials for several other useful products. If we consider an industry like that of glycerine production, one obtains in addition to glycerine, considerable proportion of alcohol and acetic acid. While it may be furiously contended that the soap lye is a more profitable source for this commodity, it should be remarked that the aim here is not to convert all the molasses into these products. On the other hand, whatever quantities may be employed for this purpose to a proportionate extent valuable by-products are also secured. Both glycerine and alcohol find wide application in medicine and industry. Indeed we require large amounts of alcohol too for the development of the indigenous drug industry. It cannot be said that we will have a large excess of glycerine for which there may not be use. If we realise that the availability of glycerine in large quantities, both cheap and pure at the same time, opens up a wide field for synthetic resin production and also for manufacturing cheap cosmetics and pharmaceuticals, the argument against this idea will not be pressed. It is rather unfortunate that the average scientist even today associates glycerine with dynamite and frowns upon this material which has immense possibilities in an industrially virgin country like India. Acetic acid also will be in great demand in resin and allied manufactures. It is to be regretted that the study of this problem has not so far been encouraged.

There are other fermentation industries (processes) for which molasses is eminently suited. India is lacking in gluconic acid, and calcium gluconate is such an important

chemical which fills a void in nutrition. In spite of the fact that it is a costly compound, it is best fitted for administering calcium into the system. Sufficient amount of research has been carried out in other countries. It remains only to adapt the same to our conditions. The utilisation of molasses for this purpose is thus a problem which can be tackled with considerable advantage. A useful beginning has been made at this Institute on this question. The fungus responsible for the production of gluconic acid has to be trained and acclimatised to this acid before it is made to produce the same.

One other product of industrial importance is that of butyl alcohol along with acetone. The glucose present lends itself to the formation of this substance under the action of certain specific micro-organisms. While starchy materials have formed cheap sources for the production of acetone, used as a solvent and in dynamite manufacture, its formation in the conversion of sugars to butyl alcohol can be advantageously utilised to secure both of them. It is therefore worth while to investigate the feasibility of employing molasses profitably for this purpose. The potentialities of molasses for the preparation of oxalic acid through the action of fungi such as *Aspergillus niger* have remained unexplored and offer a wide field for enquiry. Here again, although waste products such as sawdust may have formed suitable raw materials, the possibility of this cannot be minimised. The commercial production of this acid should therefore be examined.

But a more profitable use for the molasses from diverse sources lies in its serviceability for the manufacture of yeasts. Although this may not result directly from fermentation, this process is arrested suitably with a view to making the nutrients available for releasing sufficient energy for the rapid and high multiplication of a given type of yeast. Thus for instance, if the carbondioxide respired by yeasts in the process of fermentation be withdrawn through aeration, the production of yeast is considerably accelerated. A preliminary study in this direction carried out at this Institute has served to emphasise the

influence of "carbon:nitrogen" ratio in this reaction. While yeasts find application as cattle feed or as fertiliser, it has not somehow attracted the attention of the the investigators nor that of the industrialists in India. The particular use to which a type of yeast could be satisfactorily employed is largely determined by its composition. If yeast can be manufactured in sufficiently large quantities, there is a wide field for research and scope for the investor to profitably turn these to valuable products such as substitutes for bakelite, horn etc. Comparatively little is known of the composition of yeast as influenced by nutrition factors, the nature of which is under study.

Fertilisers from molasses. The usefulness of molasses as fertiliser is based again on its carbohydrate and potash contents. It stands to reason that the direct application of the same to alkali soils is of benefit, since the acids arising in the process of sugar fermentation neutralise the alkali thereby imparting more desirable characters to such soils, as has been demonstrated by the work at Allahabad. But it does not appear to have been established whether this is of a permanent or temporary nature. That different acids are released from application of molasses into soils has been proved in a series of researches conducted at Bangalore. The mechanism of toxic action induced in the soil through such application of this product to paddy growing has also been explained as being due to iron (ferrous) salt etc. If the soil be kept fallow following the treatment for a few weeks, beneficial results accrue to the crop. It does not matter whether the application is made with the solid product or with the viscous molasses.

Perhaps the most important procedure that calls for attention is the fact that molasses is burnt either completely in specially designed furnace or carbonised to yield the ash without much waste of fuel. In either case, the fertiliser value of the resulting ash is mainly due to its potash content. The above procedures lend themselves to easy extraction of potassium. What is of greater significance is to know whether the molasses should at all be burnt. A valuable commodity like the sugar which is necessary for

every organism should not be wasted because it has no other use or because no other use has so far been devised for the same. The attempts of Brazil coffee bean growers to burn off the berries to keep up the price level by such means is not worthy of imitation. Moreover, the argument has been advanced that molasses does not contain much nitrogen and can therefore be safely disposed of by this method. One is entitled to differ from this assertion. It is really commendable that in some places in Europe, molasses is first fermented to produce desirable products and subsequently concentrated, dried and burnt to recover the potassium from the residue.

There is one more possibility of utilising the molasses in the fertiliser process. It is well known that certain cellulosic materials such as corn stalk cannot be employed for composting in view of their resistance to attack by micro-organisms. Some years ago, some work was carried out on the feasibility of employing molasses as a biological starter in the disintegration of resistant cellulosic matter represented by bagasse. Some of the factors involved in the technique were varied and the experiment was also conducted on the laboratory scale. The results of this study revealed that molasses helps to break down the unattackable woody material, yielding a fine clean type of organic fertiliser, recognisable by its characteristic smell. The procedure has been systematically followed on the analytical side. Further investigation is under way to determine the other factors that contribute to the production of a high grade fertiliser. The production of this compost material on a large scale offers commercial possibilities, the potentialities of which cannot be assessed at the moment without elaborate studies.

Improvement of molasses through adequate treatments. It will be clear from the above that there is an inter-relation between the two important products realisable from molasses, namely sucrose and potash. The presence of large quantities of potash is assumed (believed) to inhibit the separation and recovery of cane sugar. On the other hand, the recovery of potassium in the pure state or even

admixed with other mineral matter is accomplished following the destruction of the organic matter present in the molasses as sugar.

Removal of potash from molasses. It appears that if the procedure adumbrated by previous investigators were reversed, several possibilities present themselves. Since adequate research has not yet been carried out, these must be indicated only with reserve. It is well established that plants including beet, sugarcane etc. derive potassium so necessary for their growth from soil. On a rough estimate, it has been ascertained that sugarcane alone extracts on the average 100—150 lbs. of potash per acre. Nearly three-quarters of this quantity are in soluble form being present in the juice. If the potassium taken up by the plant be not returned to the soil, the latter will soon be depleted of its readily available supply of this component, the lack of which leads to diseases on the one hand and to a poor development of the crop on the other. In the process of preparing cane sugar, cane juice is concentrated along with its contents chiefly potash following clarification. The removal of sugars is accomplished more than once from the concentrates, the residue from which is the final molasses. The entire potassium is found in predominant amounts in this final product. On the basis of 1935—36 production figure at 500,000 tons, one can compute readily the total output of potash at 16—20 thousand tons on dry matter thereof. Since 1932 the quantity of total molasses produced is quite high indeed, whereof the potassium in it can be safely estimated at 110—140 thousand tons. Allowing for nearly half the production of molasses for consumption in indigenous and cottage industries, the residual potash alone reveals an acute situation.

The problem of potash recovery cannot adequately be solved through burning of the molasses for fuel or even fertiliser purposes. The precipitation of potassium as potash alum directly from molasses through the addition of Aluminium sulphate has already been patented. Whether the same is feasible or not in India, cannot be easily assessed. On the other hand, removal of potassium as

cream of tartar in a highly acidulated medium has recently been critically studied at this Institute and appears to be capable of adoption either as a small scale industry or as a large scale factory operation. The technicalities of this operation can be found in a patent recently applied for.

The residual molasses can admirably serve for the manufacture of several useful products. It consists chiefly of sugars alone and quite a low percent of salts. It can now be suitably diluted for fermentation purposes such as production of alcohols and acids etc. and for production of yeasts on a manufacturing scale. The recovery of sucrose from this material is under investigation. But the diluted molasses can be inverted readily and clarified to yield a highly concentrated syrup which might form a ready substitute for honey. There is no doubt that such a syrup will also be a useful adjunct for table service. The most useful (and paying) procedure would relate to a preparation of cattle feed from such molasses. In view of the fact that most of the bitter principle (due to potassium salts?) has been removed by the method indicated above, the residuum has an agreeable taste with the original flavour. It is possible to produce also cheap cattle feed in factories adopting the above technique. The nutritive value of such a feed would then be mainly due to the sugars present therein. If in the process of mixing it with wheat *bhusa* or rice straw, some nutritious material is incorporated, it will add to the value of the feed. Such a study is in progress. The stock will consume it more readily.

It will be clear from the above that for the proper utilisation of molasses, it is necessary to divert it into several channels indicated above. Whether it is worth while to have one large factory to collect all the molasses and dispose it of in one locality or whether a few concerns can divide their interests into zones and work out these as a cooperative concern is a matter for discussion by the financier. Sufficient scope has been indicated for the suitable utilisation of this at-present-wasteful product.

Based on a memorandum submitted before the Indian Tariff Board (Sugar) 1937.

24/39-62

9th May 4

Dear Sir,

Your letter dated 4th May 1940 together with a note on the "utilisation of molasses for the production of potassic salts" to the First Member of Council has been referred to me. I am likely to be in Bangalore about the third week of this month. I shall be extremely glad to discuss this proposition with you personally at that time. I would like to know from you whether you are likely to be in Bangalore between the 20th and 25th of this month. I shall let you know in advance the date on which we could meet.

To discuss the commercial possibilities of this proposition, I should be glad to have from you a rough idea of the cost of production by the process evolved by you, so that it could be compared with the present market prices.

Yours sincerely,



A.V. Varadaraja Iyengar, Esq., B.A., D.Sc. A.I.C.,
Biochemist, Indian Institute of Science,
P.O. Hebbal, Bangalore.

To no 13872.
6.5.40

Submitted to the Director,
Sandalwood Oil Factory,
Mysore, (Camp) Bangalore.

I have gone through the note furnished by Dr. A. V. Varadarajaiengar carefully. I am afraid that the details furnished are too meagre to come to any decision regarding taking this up as an experimental work on a pilot plant scale. It should be possible by preliminary experimental work to obtain an idea of the yield of Pot. Salt from a given weight of molasses and a rough idea of the cost of production. The note does not give this information to enable one to obtain an idea of the cost of manufacture by this process compared with the present market prices.

Regarding equipment, here again, the details furnished are very meagre. From the type of equipment that is suggested to be obtained, it appears to me hardly possible to obtain them at the estimated figure of Rs. 5,000/-. It is therefore necessary to obtain detailed information on various process requirements before we can come to any decision for carrying out this scheme on a pilot plant scale. There is one aspect of the question, the availability of tamarind fruits for this purpose. It appears to me worthwhile to consider the possibilities of manufacturing tartaric acid from tamarind fruits to meet the present situation rather than use the tamarinds as a source of tartaric acid for isolating Pot. Salts from molasses. At present the only source of tartaric acid and its salts is "Argol" which is ^{mainly} imported from France. A small quantity of this material is understood to be produced in America also; but the bulk of the world's supply comes from Argols. It is already reported that the production of Argol in France has diminished considerably within the last six months due to the men engaged in this work being taken away for war purposes. If it is possible I would very much like to discuss the entire position with Dr. Varadarajaiengar before I can report further to the Director. (With this source likely to be cut off it may be worthwhile to turn our attention for isolating tartaric acid from our local raw materials.)

Said:
Dr. Varadarajaiengar said
that he would
pursue this question
and write the
report. R. -
9/5-

nm
9/5-

BHK/KVV.


Chief Chemist I/C
Indl. & Testing Laboratory.

V. VARADARAJA IYENGAR, B.A. D.Sc. A.I.C
BIOCHEMIST

Indian Institute of Science,
Hebbal, P.O., Bangalore.

Ref: 71

Date: 14th May 1940.

K. Parthasarathy, Esq., B.A.,
Director, Sandalwood Oil Factory,
Mysore.

Dear Sir,

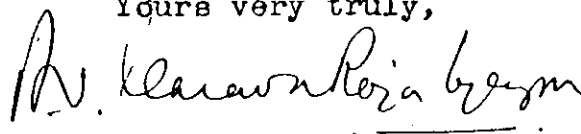
I write to thank you for your kind letter No.24/39-40 dated 9th May 1940.

I expect to be away from Bangalore ~~during this~~ between the 21st and 28th instants. If it is not inconveniencing you very much, I would find 20th most convenient. Alternately, I should choose the 30th inst after my return from North Indian tour. I regret to having caused you some inconvenience in the choice of date. I shall be obliged if you would kindly advise me of your convenience.

Thanking you in anticipation,

AVV/KR.

Yours very truly,

R. Karanth

.K.Parthasarathi, L.A.,
Director.

Office of the Director,

DESPATCHED 15th ay /40.

56/39-400

Dear Sir,

I have your letter No.71 of the 14th instant. Thank

At the present moment, I am not in a position to let you know definitely whether I would be in Bangalore by the 20th of this month. If I happen to go over to Bangalore, I shall let you know in advance. If I miss going to Bangalore by the 2 th, I shall see you after your return from Northern Indian tour.

Yours sincerely,



mm
14/5

Dr. A.V. Varadaraja Iyengar, B.A., D.Sc., A.I.C.,
Biochemist, Indian Institute of Science,
H.O. Hebbal, Bangalore.

KF:ATK)

Office of the Director,

17th May /40.

L.O.
56/39-40

Dear Sir,

Further to my letter of even No. dated the 15th inst.,
I write to inform you that I shall be glad to meet you at
the Industrial & Testing Laboratory, Bangalore, at 9-30 a.m.
on the 20th. I hope this will suit you.

Yours sincerely,



Dr. A.V. Varadaraja Iyengar, B.A., D.Sc, A.I.C.,
Biochemist, Indian Institute of Science,
P.O. Hebbal, Bangalore.

atk)

File no. 19
 1 letter & note

Sub i .

I discussed this morning with Mr. J. W. Rogers the proposition of a pilot plant for the manufacture of potash for soda from the available in the Mysore Sugar Co. Ltd., Mysore. Dr. Van der Jenter has given an idea of the cost of production and the return to be set on the sale of potassium sulphate and soda, treating 100 tons of molasses.

100 tons of molasses: 3.45 K₂O.

Theoretical yield of cres 11 tons.

Yield realized. 11 tons

Sulphuric acid required. 11 tons

Cost of molasses:--

For proc. sug.	.11 -	For sale of 5.00
For cost of sulphuric acid	.05/-	of K ₂ SO ₄ 1,270
Line store:	.40/-	By sale of
Sulphuric acid	.50/-	
For works establish-		5 tons
ment.	.64/-	
For sulphuric acid, etc.	.145 -	
Total:-	76/-	

The above calculation, however, has not been taken into the price of sulphuric acid to be supplied at the present market rates. It is to be noted that the cost of sulphuric acid is a considerable item in the cost of the process. The price of sulphuric acid is a variable factor and the cost of the process will be affected accordingly. The cost of the process will be affected accordingly.

The difference between sale price and the cost of production works out to about .0001/- for 100 tons of molasses treated.

The question now is the price that should be fixed for molasses, if any price is to be fixed at all. I understand from Dr. Varadraj Iyer that the loss of sugar in the molasses undergoing treatment is so negligible that it does not interfere with the alcohol recovery and he is prepared to establish this fact to the satisfaction of the Revenue Department. For my part I think if it is considered that there is no loss of sugar in molasses so treated, the question of price to be fixed for molasses should not arise at all. On the other hand, molasses coming out after the treatment, would be free from a good deal of foreign matter and could be used for any purpose by mere additional dilution for the usual process of alcohol recovery. It is also stated that there is an additional advantage of putting the molasses through this process for the production of ketone which on account of the fact that the clear solution of alcohol could be more extensively utilized for the recovery of clear yeast for fermentation etc.

One of the objections that has been made in this process, I understand, the utilization of molasses, is in the article of food.

From the statistics available, the quantity of tannin fruits exported from the State is on an average 7,000 tons annually. The average production of molasses in the State factory is estimated at about 35 to 40 tons per day, of which only about 20 tons are now being used for alcohol recovery. If the surplus 20 tons or in any case, 25 tons of molasses are used for the recovery of alcohol, the quantity of tannin fruits for the works will be reduced to 10,000 tons, but the quantity of molasses used for the recovery of alcohol is only about 10,000 tons. Dr. V. M. V. tells me that the quantity of about 1,000 tons will quite do for the purpose, and this quantity is only about 10 to 15% of the quantity of molasses exported. The utilization of tannin fruits will therefore interfere very seriously with the consumption of tannin fruits as a article of food.

With regard to acquiring the necessary for the Pilot plant, I have requested Dr. V. M. V. to go round the Industrial Section Laboratory along with Mr. L. M. and find out the cost of these and let them be utilized for experimental purposes to let me have list of equipment and cost together with its cost. This will be completed soon after his return from Europe and I will inform you.

He expects to be back by about the first
week of June.



Director,
Sandelwood Oil Factory.

The First Member of Council
through
The Development Secretary to
Government).

YP:ATK)

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Proposals for consideration.

1. Utilisation of molasses for recovering Potash salts serviceable in agriculture (as fertiliser) and in industries.

This recovery of potassium salts from waste molasses is sought to be effected before the latter is fermented to produce alcohol. It is accomplished through treatment with tamarind juice, available in abundance in the State. The tartaric acid present in this juice is recovered from the precipitated cream of tartar in a suitable manner and employed to treat fresh molasses. In this manner, the economy of the process is ensured. The Chairman of the Mysore Sugar Co. had personally acquainted himself with this process and shown great interest in it. The scheme had been under his consideration for some time. It appears possible to derive more than 300 tons of potassium sulphate (fertiliser) from that portion of molasses which is now fermented in the distillery at Mandya. This potassium is lost at the moment. Other more valuable salts of potash can also be secured with potash as the base. The capital ~~an~~ equipment for this would be about 1,25,000 rupees on a rough estimate and the profits about 15,000/- rupees. Most of the equipment can be made out of materials available in the country.

2. Tartaric acid from green tamarind fruits:-

The country's requirements of tartaric acid are over 100 tons per year. The mature but unripe tamarind fruits have been shown to be an easily workable raw-material, though difficult to preserve, in preference to the readily storable ripe fruits. This difficulty has been overcome

by a simple process of dehydrating the same, developed in the Institute and covered by a patent. The quantity of tamarinds exported from the State has averaged over 7,000 tons annually and in the present case, the quantity required will be the equivalent of 1,500 tons of the ripe fruit. This proposal could be easily worked by the Mysore Chemicals & Fertilisers, Ltd. and in fact, the Government Director of Industrial Concerns has shown keen interest in it. The cost of the equipment may not be over 1 lakh of Rs. and advices have been received that the equipment can be had from England. A large part of the mechanical equipment could be rigged up here. It is anticipated that the cost of production will work up to 1,100/- rupees per ton at the prewar rate. The selling price also at that rate will be Rs. 1,400/-, thus ensuring a net profit. The present emergent conditions offer excellent opportunities, as this acid is not so readily available now and the current prices are favourable for the proposal. The State would have the credit for supplying the ~~entire~~ entire requirements of the country.

Extract from Dr.Sir Martin Forster's letter
dated 10/5/40 to Dr.A.V.Varadaraja Iyengar.

"Immediately on returning here,after seeing
you, I wrote to Mr.Matthan (8th April) and
received his reply (dated 11th April) stating
that they are are "looking into the possibilities"
of your process. Meanwhile, another month of
molasses.- Potash - has gone down the drain
I suppose!

100 tons of millarose: 3.0% K₂O.

Theoretical yield of cream glutar = 12 tons.

yield realised = 11 tons. $\rightarrow 1 \text{ ton}$

Tartaric acid required = 10 tons

35-60
42-45
1400
3 20x600.

To cost of millarose:	500-	To sub of	
To process:	11 Rs.	5.3 tons of	
To cost of chemicals:		K ₂ SO ₄ at 1272	
Limestone :	40 Rs.	240 B. (100)	
Sulphuric acid:	500 Rs.	8 sub of	
To work's cost	64 Rs.	Gypsum 5 lb	
To Depreciation etc.	145 Rs.	@ 20 lb.	100
	<u>760 Rs.</u>		<u>1372 Rs.</u>
	1280		

cream glutar:

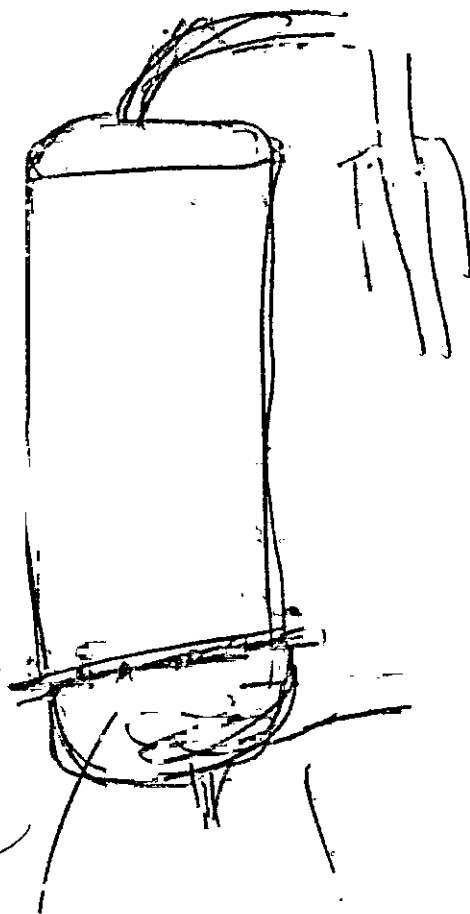
60 x 3.0 $\rightarrow$ 180 (100) x 4 = 720 tons green of
Realised = 650 tons

Tartaric acid = 572.4 tons. So = 600 tons
Tamarind fruits (green @ 3.5%) 19000 tons

8
1.5

1-15
30ms

76700



6000 - 7000.

18000 → 21000

700

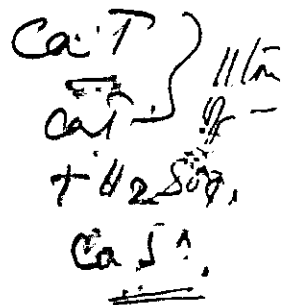
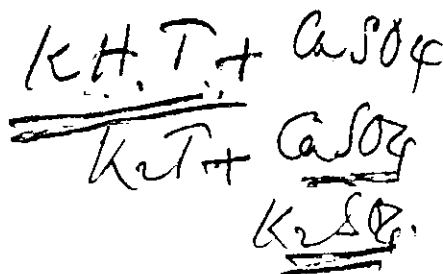
$$\begin{array}{r} 6000 = 30000 \text{ K} \\ 600 \\ \times 1000 \text{ B:} \\ 750 \end{array} \quad \begin{array}{r} 450000 \\ \hline 48 \end{array}$$

90£
95 c. i. f.
95 × 6500

$$\begin{array}{r} 900 \\ \hline 615000 \text{ £} \end{array}$$

650 tons: $\times 13$ 7
6000

100 -
20 tons - 02



5 × 112
560 × 3.5
16.8 152 308

100 tons - 120 tons
40

Ref: NO. 84

Date 4th June 1940.

K. Parthasarathi Esq., B.A.,
Director, Sandal Oil Factory,
Camp, Bangalore city.

Dear Sir,

As agreed between us on the 21st May last, I met Mr. B. H. Krishna of the I.T.L. yesterday afternoon regarding the equipment available there for the pilot plant operation of the process for the recovery of potash from molasses.

In confirmation of this morning's talk, I wish to ~~restate~~ state the requirements indicated in my earlier note to the First Member of Council. It would require some alteration arising out of my discussion with Mr. Krishna involving a reduction in the expenditure anticipated by me. These alterations relate to the utilisation of teakwood vats and barrels in place of the enamelled and stoneware vessels, for the ~~purification~~ precipitation and subsequent treatment of the purified cream of tartar with diverse salts. It is hoped that the extraction of tartaric acid from both cammaric and lime tartrate could be effected in leadlined wooden vessels. A mod. leadlined apparatus could be prepared for concentrating the aqueous extract with low pressure steam. Unfortunately none of these equipments appear to be had from the I.T.L. for carrying out this test. These have therefore to be made. The total cost for these items may not exceed Rs. 25 excluding some of those that may be made available in Bangalore. I think small provision has to be made for the chemicals required.

In this connection, I wish to emphasise the fact that my earlier requirements were made on the basis of the equipment employed in factor operations on the Continent both for Citric and Tartaric acids, but on a reduced scale. In none of these cases, has it been recommended to concentrate the dilute extract in the open; on the contrary, the practice has been to evaporate the same in vacuo to avoid losses due to decomposition. In this test, certain modifications may be incorporated without much loss of the valuable tartaric acid. The actual details of the different parts of the assemblage will have to be worked out subsequently, unless I am required to submit the plans in advance. I shall be obliged to you for your kind advice on this point.

Thanking you,

Bearing off at Mysore

along with my rep. note

Submitted to the Member.

AV

5/6

I remain,
Yours sincerely,

Dr. S. Srinivasan

Mr.K.Parthasarathi, B.A.,
XXXXXXXXXXXXXXXXXXXXXXX

58/39-20

14th June

/40.

Dear Dr.Varadaraja Iyengar,

I have this day submitted your letter No.84
dated 4th June 1940 to the First Member of
Council and will further communicate with you
after receipt of instructions.

Yours sincerely,



Dr.A.V.Varadaraja Iyengar. B.A., D.Sc., A.I.C.,
Biochemist, Indian Institute of Science,
P.O. Hebbal. (Bangalore.).

atk)

Mr. K. Parthasarathi, B.A.,
XXXXXXXXXXXXXXXXXXXXXXX
Ag.

58/39-40

14th June /40.

Dear Mr. Noronha,

Utilisation of molasses for the production of
Potassic salts.

In continuation of my un-official note No.C.19/
Enc's.2 dated Camp.Banalore, the 22nd May 1940,
I am submitting herewith a letter received from
Dr.A.V. Varadara'ia Iyengar for the information of
the First Member of Council.

Yours sincerely,

K
2

Charles E. Noronha, Esq., M.A.,
Secretary to the Government of
Mysore, Development Department,
Camp. MYSORE.

atk)

MR. C. E. NORONHA, M. A.,
Secretary to Government,
Development Department.

PUBLIC OFFICES,

Bangalore, 9 July, 1940

O. No. D 132 Enb

Dear Mr. Parthasarathi,

Subject:- Utilisation of Molasses for the
production of Potassic Salts.

With reference to your letter No.58/39-40 dated
14th June, 1940, on the above subject, I am directed to
request you to be so good as to have Dr. Varadaraja
Iyengar's scheme placed before the Industrial Research
Sub-Committee constituted in this Office No.D.5934/1.& C.
376-39-4 dated 28th June, 1940.

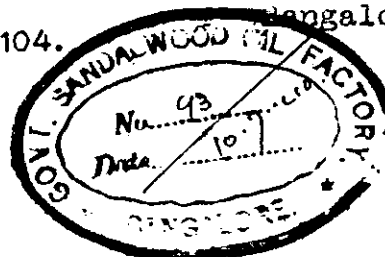
The connected papers are returned herewith.

Yours sincerely
C. E. Noronha
9/7

K. Parthasarathi, Esquire, B.A.,
Director, Sandalwood Oil Factory
and Secretary, Industrial Research
Sub-Committee, M y s o r e.

Indian Institute of Science,
Bangalore. Date 9th July 1940.

Ref: 104.



Peel this along with Dr. A. V. Iyengar.
10/7

Dear Mr. Parthasarathy,

In continuation of this morning's talk, I have pleasure in sending you a typed copy of the note appearing in the June issue of Current Science relating to Yeast as a by-product from molasses.

What is of direct interest to us in this note relates to the fact that almost all the potash initially present in molasses is literally going "down the drains" in the words of Sir M.O. Forster, without the potash being recovered at any stage. Nearly 95 per cent of the potash thus lost. (Table B). The suggestion of the author of the note that the yeast is rich in regard to this mineral also is not quite tenable so far as its use as a fertilizer is concerned. In fact raw molasses may be more useful in view of its high potash content. The author has also suggested that the fermented slop could be evaporated being rich in this mineral. I do not think any factory could find such an amount of free steam as to evaporate every day 18 to 19 thousand gallons of the solution from 20 tons of molasses. But the note is an eye-opener to us that the daily loss of potash from the distillery is quite significant. Reckoned at 3.5 per cent. K_2O , the total loss of potash from 25,000 tons of molasses (rough production estimate of the Mandya Sugar Factory for the last 5 years) would be large indeed.

On the contrary, according to my method, the recovery of potash as cream of tartar is made at a dilution of 2 to 1 of molasses and the final dilution will hardly be even 1 to 2, while for the fermentation industries, the raw material is diluted six times. The proportion of potash recovered is nearly 90 per cent., if not a little more. In other words

=2=

even the treated molasses according to this method could be further diluted for fermenting to alcohol. The sugar lost is nothing.

I would have liked to bring this aspect of the note substantiating Sir Martin's words, to the notice of the First Member of Council, but I now feel that your reference to the Member on this point would add greater significance and weight to it.

With kindest regards,

Encl. One.

Yours sincerely,

H. Lawrence

K. Parthasarathy, Esq., B.A.,

Director of Sandalwood Oil Factory,

M Y S O R E.

mur
10/7

DISTILLERY BY-PRODUCT -- YEAST.

A By-product in the alcoholic fermentation of molasses, yeast is obtained as a deposit mixed with calcium salts, and is sufficiently rich in nitrogen, phosphate and potash to be used as manure alone or as admixture with compost. The yeast occurs also in suspension in the fermented solution to the extent of 0.75 per cent. by volume, which can be recovered by centrifuging. Together, the yeast takes up 70 per cent. of the nitrogen present in the fermenting liquid; 93 per cent. of the phosphate and 3.2 per cent. of the potash in the molasses are also utilised. Removal of suspended yeast by centrifuging the fermented wash, prior to distillation, is good practice as it reduces the fouling of distilling plates. The spent wash, or slop, then, contains the rest of the salts mainly potash which is recovered conveniently by evaporation.

100 tons of molasses on fermentation, deposit 6 tons of yeast sludge which after washing and settling yield 2 tons of air dried yeast. A proximate analysis of the yeast and the distribution of N, P and K_2O are given in Tables A and B.

Table A.

	Molasses %	Dry Yeast %	Slops (free from Yeast) %
Nitrogen	0.5	8.5	0.05
Phosphate	0.2	3.5	0.003
Potash	3.5	2.1	0.83

Table B.

Molasses + Am. salt	Yeast		Slops
	Deposit	Suspension	
100 + 0.7 tons	2 tons	3.33 tons	91,000 gals.
Nitrogen, 1434 lbs.	380 lbs.	634 lbs.	420 lbs.
P_2O_5 448 lbs.	156 lbs.	262 lbs.	30 lbs.
K_2O 7,840 lbs.	94 lbs.	157 lbs.	7,589 lbs.

The yeast deposit is generally washed out in distilleries. The recovery of this yeast as a supplementary nitrogenous and phosphatic fertilizer would be worth while.

Y.K. RAGHUNATHA RAO.

No 58/29-40

13th July

0

Dear Sir,

Dr. A.V. Varadaraja Iyengar, Bio-chemist, Indian Institute of Science, has submitted a scheme for the utilization of molasses for the production of potassium salts. As I wish to have a personal discussion with you on this subject, I shall be very much obliged by your letting me know your convenience. If you can kindly fix up a date and time, I shall come over to Bannimantap.

With best regards,

I remain,
Yours sincerely,



Sir Martin Forster. F.R.S.,
Old Bannimantap, MYSORE.

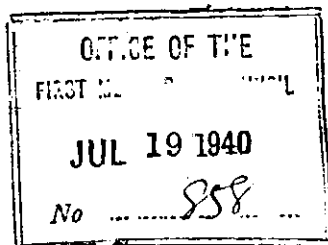
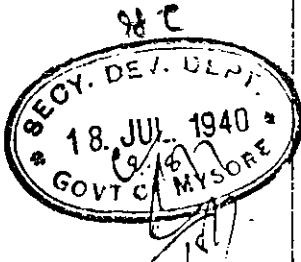
KP:ATK)

58/39-40

Office of the Director,
Sandalwood Oil Factory.
Mysore, Date 17th July 1940.

Notes.

Subject:— Dr. A.V. Varadarajengar's proposition— Utilization of
molasses for the production of potassium salts.



Submitted.

As per instructions, I interviewed Sir Martin Forster at Bannimantap, this morning, and discussed with him Dr. Varadarajengar's proposition.

Sir Martin Forster stated

(1) that the chemistry of the proposition was quite sound,

(2) that he is not competent to discuss the economic aspects of the proposition, and

(3) that it is advisable to take up this proposition on a commercial scale on the results obtained after experimenting with a Pilot plant, provided the expenditure relating to the Pilot-plant's operations can be kept within the limit of Rs. 5,000/-.

Dr. A.V. Varadarajengar's proposition will be placed before the next meeting of the Industrial Research Board proposed to be held early next month.

Director,
Sandalwood Oil Factory.

The First Member of Council
through
The Development Secretary to
Government)

KP:ATK)

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A. W. A. E.)

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Office of the Director,
Sandalwood Oil Factory,
Mysore, 17th July 1940.

Dr. A.V. Varadarajengar's proposition - Utilization of
molasses for the production of potassium salts.

Submitted.

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Research Board proposed to be held early next month.


Director,
Sandalwood Oil Factory.

The First Member of Council
through
The Development Secretary to
Government)

KP:ATK)

With the compliments of
Dr. A.V. Varadachari
23.8.40.

TARTARIC ACID MANUFACTURE IN INDIA.

Pt. III

Utilisation of tamarind extract for tartaric acid production.

(By Dr. A.V. Varadachari Iyengar, Indian Institute of Science, Bangalore.)

INTRODUCTION.

It has been shown previously that green tamarinds form an excellent raw material for the production of an extract containing essentially tartaric acid. In view of the fact however, that the green fruit is easily perishable and is available in abundance only for a few weeks during the season, a simple method of partially dehydrating the fruit was evolved, whereby part of the acid was immediately secured in the water separated and recovered as lime tartrate after clarification. The resulting wet material could be dried more readily at the ordinary temperature and stored for subsequent extraction of the acid. This latter process could be adopted in the off-season, the leaching being effected with cold water and clarified as before. In the present part, the utilisation of the extracts for preparing pure tartaric acid will be considered.

LIME TARTRATE FROM TAMARIND EXTRACTS.

It has been further ascertained that the clarified extract obtained in the above manner contains tartaric acid varying between 2.5 and 3.0%. For several reasons, it does not appear worth while to concentrate this extract. It is recommended therefore that the acid may directly be precipitated as its lime salt through the addition of lime or chalk, for which purpose the tartaric acid content must be determined, preferably as the insoluble cream of tartar. To a quantity of the solution under test, an equal volume of alcohol (96.0%) is added and the resulting precipitate removed by filtration, and washed with dilute alcohol. To this is added a saturated solution of potassium carbonate, whereby the cream of

tartar separates readily from the liquid. If necessary, the acidity may be maintained through added acetic acid. The cream of tartar is filtered and washed with dilute alcohol, dried and weighed. The purity of this product is ascertained by titrating a known quantity of the precipitated salt against standard alkali. The free acid content is then determined from this value.

The clarified extract from the tamarind fruit is treated with the required quantity of lime as milk of lime or with the reckoned amount of chalk, so as to neutralise the acid. It is of the greatest importance that the chalk or lime employed must be highly pure, in as much as such impurities as iron or magnesium affects the purity of the prepared acid through the formation of magnesium and iron sulphates which would contaminate the final product. The neutralisation of the tartaric acid in the extract is an important item and requires careful control. When the neutralisation is complete as indicated by litmus, the extract becomes generally turbid and affects the purity of the lime tartrate. It is therefore necessary to neutralise the extract till it reacts weakly acidic. The quantity of lime added will thus be less than what is quantitatively required for neutralisation. In this case, the extract is quite clear. Another advantage secured by keeping the reaction acidic in the precipitation of the lime tartrate relates to the fact that the latter which is usually granular, though in a fine state of division, does not cake on drying. Where the neutralisation is thorough and complete as determined by litmus, the impurities precipitating with the lime tartrate aid in cake formation, when drying. The granular precipitate obtained in

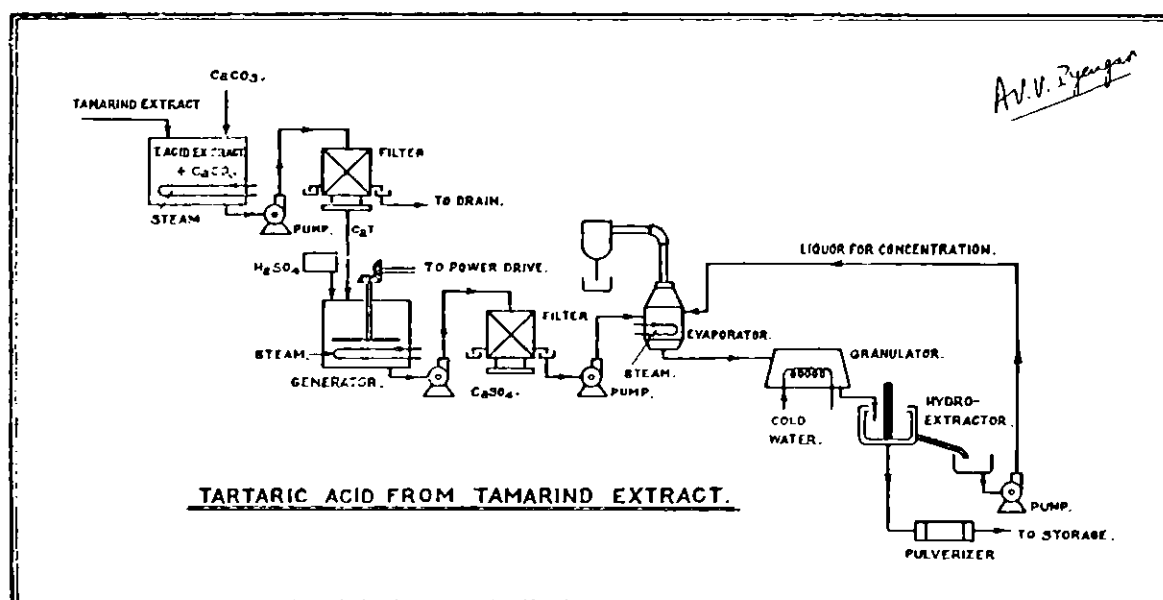
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this manner is easily filtered in a filter-press, following a preliminary decantation if necessary. In the writer's experiments, this salt was light grey or greyish brown in colour. Even when the extract was boiled and concentrated in the open, the final lime salt was only light brown in colour. This precipitate is then washed with cold water and dried.

TARTARIC ACID FROM CALCIUM TARTRATE

The production of tartaric acid from lime tartrate follows well-known practices and differs in some respects in different countries,

the variations relating to details of manufacture only. The equipment required for the production of the acid in the finally pure state will thus be a standard one. Incidentally, it may be mentioned that this equipment calls for special materials of construction in view of the high corrosive action of the acid on common metals. Since much of the information on the production of the acid is based on processes described in technical journals, only the more important once will be indicated herein. The process described here is illustrated in the accompanying diagram.



The lime tartrate is transferred to a lead-lined wooden vat provided with a stirring arrangement consisting of wooden paddles and with inlet for steam and decomposed with the required quantity of Sulphuric acid. In factory practice, the following procedure is adopted. A quantity of water or preferably medium liquor from a previous batch of the decomposed tartrate, is introduced into the vat and mixed with a quantity of sulphuric acid equivalent to the amount of lime or chalk employed for neutralising the tartaric acid. Where the factory has to depend upon the market lime tartrate for its manufacturing purposes, the lime content of the latter is

determined according to known methods and the required quantity of the mineral acid computed from this value, employed to effect the decomposition. Steam is then led into the vat to maintain the liquid at a higher temperature. It is imperative that for effectively decomposing the tartrate, this should be in the neighbourhood of 70°C. Sulphuric acid is generally employed in the form of oil of vitriol (sp. gr. 1.640). The calcium tartrate is next added in small lots at a time to avoid heavy frothing which results in the course of the decomposition. When the addition of lime tartrate is completed, the heating is continued for another half hour, while the

Tartaric Acid Manufacture in India.

presence of an excess sulphuric acid is to be ensured, through adequate tests so as to be certain that all the tartrate has been decomposed. With calcium chloride (sp. gr. 1.30) the test is carried out. In practice, one may keep the sulphuric acid added in excess at nearly 3.0 per cent. on the volume of the solution employed. It is rather essential that the relative proportion of the two acids in the decomposed liquid must be maintained throughout the different batches, as varying yields of tartaric acid will be obtained even from liquors of the same specific gravity.

FILTRATION OF CALCIUM SULPHATE.

The filtration of the tartaric acid liquid from the decomposed lime tartrate is carried out in a filter press, made of wood, the filter cloth employed being hessian or jute. In the Continental practices, this procedure varies very much in recent times. The decomposition vats are modified to some extent so as to adequately serve for filtering by gravitation the liquid obtained by treating lime tartrate with sulphuric acid. Inside the vat, a false bottom of wood with a number of holes and supported on wooden joists is covered with a jute filter cloth, the sides being caulked by jute ropes. The calcium sulphate settles on this hessian and forms a thick filtering medium, the filtered liquid being drawn off at the bottom. When the decomposed material is allowed to settle, the sulphate forms itself as a thick cake over the covered false bottom and serves as a good filtering medium. The filtered liquid is collected in three different concentrations, the strong, the medium and finally the weak washings, each of which is collected in separate tanks and connected individually to the vat through a *moute-jus*. These liquids are utilised in different ways. After the decomposition, the liquor is collected by being connected at the bottom to the vacuum-line when the filtration is difficult. UNDER CERTAIN CONDITIONS, the top layer of the liquid is decanted. When the strong liquor (sp. gr. 1.140 to 1.160)

containing tartaric and sulphuric acids is removed the 'mud' at the bottom of the vat is stabbed at several points and weak liquor passed on to it to effect washing of the precipitate. It is essential that the formation of cracks should be avoided as otherwise, the washing will not be efficient. The quantity of weak liquor also accumulates to an abnormal degree. The different washings are collected separately, the medium type referred to above having a sp. gr. less than 1.10. The sp. gr. of the weak liquor is about 1.050 and any liquid less in density than 1.002 is not worth collecting on account of the prohibitively high cost of evaporation.

The washed calcium sulphate must be tested for the absence of tartaric acid.

TREATMENT OF THE ACID LIQUORS.

The strong liquor containing tartaric and sulphuric acids is always transferred to the evaporators for being concentrated. The volume resulting from such concentration is generally half the initial one and the liquid would approximate to a sp. gr. of 1.390. The temperature at which this concentration is effected should not be higher than 80°C, since overheating leads to charring of the acid. When this concentration is effected in the open as is the practice in several countries, the agitators are made of wood, and the other component parts are either lead-lined or are made of wood.

The medium liquor (sp. gr. 1.10 to 1.05) obtained by washing the calcium sulphate precipitate is transferred to the decomposition vat and mixed with sulphuric acid while the weak liquor (sp. gr. 1.05 to 1.002) utilised to wash the precipitate thoroughly and forms in turn the medium liquor.

The strong fresh liquor is concentrated to a sp. gr. of 1.39 when it generally yields a crop of crystals, and the mother liquor is concentrated again, this process being repeated four times. The final liquid is termed "Old

liquor" and is purified in a separate manner. The crystals obtained in each of the four concentrations are collected separately and are known as fresh, two's, three's and so on. The different lots of crystals from different batches are collected together for further purification. Generally, these crystals are brown in colour and are utilised to produce the bright ones. While the fresh and two's form ideal materials for the production of bright crystals, the other two types require further treatments because of the greater impurities contained in them.

This crystallisation is effected in lead-lined vessels provided with cooling coils and known as granulators. After the liquid is cooled, the crystals are separated in a hydro-extractor. The brown crystals obtained in the above manner are washed in the extractor with water. If more impurities are present, difficulties will be experienced in separating the crystals in the extractor, as these will block the wires. The brown crystals must further be tested for the ash content, so as to be certain that the calcium sulphate is present at an irreducible minimum.

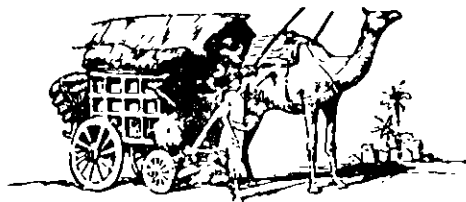
PURIFICATION OF THE BROWN CRYSTALS.

The brown crystals contain generally a part of sulphuric acid, calcium sulphate and are contaminated with colouring matter. The purification of these crystals is carried out through the addition of purified animal charcoal (vegetable charcoal such as "Norit" has been found to be of equal efficiency). The amount of charcoal added will vary with the intensity of the colour but roughly corresponds to 0.5 per cent. on the weight of the solid employed. Besides this, barium sulphide is added to remove excess of sulphuric acid and lead. The presence of iron in the liquors

is a serious defect and can be eliminated by the incorporation of calcium ferrocyanide. In the French practice, this purification is done in the decomposition vat itself, particularly the removal of sulphuric acid and of iron, before filtering the acid liquor. It is essential that after these treatments, the density of the solution must not be less than 1.30. The liquid is filtered in a filter press and concentrated to the crystallisation point preferably in enamelled iron pots. On settling and after cooling the bright crystals are formed and removed in a hydro-extractor. These are dried in a heated chamber at about 100°F and subsequently ground before being packed. Tartaric acid appears also in the form of big crystals, the method of preparing the same being omitted in the present part.

TREATMENT OF "OLD LIQUOR".

"Old liquor" is the mother liquor that remains after the fourth concentration and crystallisation. Its further adaptation for securing the pure tartaric acid is quite difficult in view of the high sulphuric acid content and other impurities. The following treatment is therefore adopted. It is treated in lead-lined wooden vats with chalk or milk of lime, as is the case with cream of tartar. In practice, the vat is charged with chalk suspended in water, to which the 'old liquor' is added in small quantities at a time, till the reaction is neutral. The presence of excess chalk should be ensured, when the contents are allowed to settle and the resulting solid separated in a filter press and washed. The solid is then transferred to the decomposition vat as a fresh charge and treated with sulphuric acid to decompose the lime tartrate. The process is then repeated in the manner described already.



CONFIDENTIAL.

INDUSTRIAL RESEARCH BOARD.

Proceedings of the First Meeting of the newly constituted Industrial Research Board Sub-Committee held on Tuesday the 3rd September 1940, at 1 P.M. at the Chambers of the First Member of Council.

PRESENT.

Rajamantrapravina N. Madhava Rau, Esq., B.A., B.J.,
First Member of Council (*Chairman*).

Members.

1. Mr. M. Venkatanaranappa, B.A.,
Chairman, Mysore Iron and Steel Works, etc.,
Bhadravati.
2. Mr. B. G. Appadorai Mudaliar, B.A., B.Sc., A.M.I., M.E.,
Director of Industries and Commerce in Mysore,
Bangalore.
3. Mr. K. Parthasarathi, B.A.,
Ag. Director, Sandalwood Oil Factory,
Mysore.
4. Mr. E. V. Ganapathi Iyer, B.Sc.,
Government Director, Industrial Concerns,
Bangalore.

Mr. K. Parthasarathi, B.A.,
Ag. Director, Sandalwood Oil Factory,
Mysore (*Secretary*).

Mr. C. E. Noronha, M.A., Secretary to Government, Development Department, Dr. K. R. Krishnaswami, B.A., D.Sc. (Lond.), F.I.C., Indian Institute of Science, and Mr. B. Rama Rao, M.A., D.I.C., Director of Geology, were also present by request.

GENERAL.

Opening the proceedings of the regular meeting, the Chairman referred to the agenda circulated to the members and said that the review of work done by the several sub-committees constituted by the Research Bureau Sub-Committee on 7th November 1939 may be taken up for consideration.

(1) *Manufacture of Super-phosphates*.—The progress of work done by this Committee was read out.

Present Personnel.

1. Dr. J. C. Ghosh, D.Sc., F.N.I.,
Director, Indian Institute of Science (*Convenor*).
2. Mr. S. G. Sastry, B.A., M.Sc. (Lond.), F.C.S.,
Director, Sandalwood Oil Factory.
3. Dr. K. R. Krishnaswamy, B.A., D.Sc. (Lond.), F.I.C.,
Indian Institute of Science.
4. Mr. E. V. Ganapathi Iyer, B.Sc.,
Government Director, Industrial Concerns (new member
from 4th September 1940).

Dr. Krishnaswamy explained the details of the experiments conducted by him in respect of phosphatic nodules of Trichinopoly. The suggestion of the Committee to depute an officer of the Geological Department was also considered. The Chairman observed whether it was necessary to depute an officer, when other raw materials are locally available for the manufacture of super-phosphates.

Mr. E. V. Ganapathi Iyer stated that Messrs. Parry & Co., Madras, are manufacturing super-phosphates out of bones collected from various parts of South India and making large profits. He said that some experiments are being conducted in the Mysore Chemicals and Fertilisers, Ltd., Belagula, and he would be suggesting independently to Government to start a fertiliser industry. The Chairman remarked that the very idea of starting the Mysore Chemicals and Fertilisers, Limited, was to develop a fertiliser industry in the State and there was no necessity to have a separate factory to manufacture fertilisers. Dr. Krishnaswamy explained to the house that the manufacture of super-phosphates from bones is a simple proposition and could be advantageously pursued.

The Chairman desired to know if statistical information with regard to the availability of bones in the State could be had from the Market Survey reports of the Department of Industries and Commerce. The Director of Industries and Commerce stated that plenty of bones were available in the State, particularly in the Malnad area, and promised to furnish complete information to the Board at its next meeting.

It was resolved that the sub-committee should investigate the position as regards raw materials, the availability of market, equipment necessary with working costs, etc.

The Chairman suggested that Mr. E. V. Ganapathi Iyer, Government Director, Industrial Concerns, may also serve as a member on this sub-committee.

(2) *Manufacture of Hydrated Lime.*—

Present Personnel.

1. Mr. B. Rama Rao, M.A., D.I.C.,
Director of Geology (*Convenor*).
2. Dr. H. S. Sharma, Ph.D. (Lond.), D.I.C. (Lond.),
Chemist, The Mysore Paper Mills, Ltd.,
Bhadravati.
3. Mr. Balakrishna, B.A.,
Mysore Iron and Steel Works,
Bhadravati.
4. Mr. G. Gundu Rao, M.Sc., A.I.I.Sc.,
The Mysore Sugar Co., Ltd., Mandya.

The Chairman remarked that further experiments should be continued at Bhadravati and also at the Porcelain Factory, and this subject may be omitted from the list.

(3) *Manufacture of Ferro-Manganese, Ferro-Silicon, etc.*—The Chairman, Mysore Iron and Steel Works, explained that the scheme for the installation of 1'500 K. V. A., electric furnace for the manufacture of Ferro-alloys had since been sanctioned by Government and that further work was in progress. Since this question had reached a stage when no further advice was necessary, the Chairman observed that further consideration of this subject might be dropped.

(4) *Magnesite Bricks.*—The Chairman, Mysore Iron and Steel Works, stated that the Indian raw material was stated to be unsuitable for the manufacture of magnesite bricks and that the Works, at present, imported these bricks from Japan, and they were giving satisfactory results. Dr. Krishnaswamy stated that as the Indian material being far too pure, the results may not be satisfactory and suggested that further experiments might be conducted at the Porcelain Factory, when the tunnel kiln was ready.

(5) *Grinding Bodies for the Cement Plant.*—The Chairman, Mysore Iron and Steel Works, explained in detail the experiments conducted at the Works.

The Committee opined that it would not be possible to manufacture these at economical rates.

It was resolved to delete this subject.

(6) *Manufacture of Caustic Soda.*—

Present Personnel.

1. Mr. E. V. Ganapathi Iyer, B.Sc.,
Government Director, Industrial Concerns (*Convenor*).
2. Mr. S. G. Sastry, B.A., M.Sc., (Lond),
Director, Sandalwood Oil Factory.
3. Mr. B. K. Ramprasad, M.A. (Hon.), D.Sc., M.I.E. (Ind.),
Government Electrical Department.
4. Dr. K. R. Krishnaswamy, B.A., D.Sc. (Lond.), F.I.C.,
Indian Institute of Science.
5. Mr. B. Rama Rao, M.A., D.I.C.,
Director of Geology (new member from 4th September 1940).

The Government Director, Industrial Concerns, pointed out that the Sub-Committee had already sent its recommendation to manufacture this chemical.

The Director of Sandalwood Oil Factory read out the recommendation referred to by the Government Director, Industrial Concerns. The Government Director, Industrial Concerns, explained the implications involved and stated that as there were no manufacturers in South India and as there was a ready market, the chemicals could be readily sold.

There was a general discussion about the Lime-stone deposits in which the Director of Geology and Dr. Krishnaswamy actively participated. It was pointed out that the demand for soda-ash and also chlorine obtained as a bye-product in the manufacture of Caustic-soda and the possibilities of utilising chlorine in the manufacture of super-bleach and bleaching powder should be examined.

It was resolved that the Sub-Committee be requested to carefully re-examine the visible market for the chemicals and other bye-products, plant and equipment required, with capital and running costs involved, etc., and to favour the Board with a comprehensive report.

The Chairman said that Mr. B. Rama Rao, Director of Geology, might also serve on this Committee.

(7) *Manufacture of Glauber Salt.*—The quantity of Glauber Salt available as a bye-product in the manufacture of Sodium-bichromate being very small, it was decided that the question might be dropped from further consideration. It was, however, considered that the manufacture of Sodium Sulphite should be kept in view in connection with the scheme for the manufacture of Acetic-acid.

(8) *Manufacture of Alum.*—

Present Personnel.

1. Mr. B. Rama Rao, M.A., D.I.C.,
Director of Geology (*Convenor*).
2. The Director of Public Health.
3. Mr. S. G. Sastry, B.A. M.Sc. (Lond.),
Director of Sandalwood Oil Factory.
4. Dr. B. K. Ramprasad, M.A. (Hons.), D.Sc., M.I.E. (Ind.),
Government Electrical Department.
5. Mr. N. K. Seshadri Iyengar, B.A. M.Sc.,
The Mysore Paper Mills, Ltd.

In view of the fact that the Mysore Chemical Manufactures, Ltd., had interested themselves in the manufacture of alum, and as, so far as the Board were

aware, no special problems were involved, it was decided that this subject might be deleted from the list.

(9) *Manufacture of Carbon Electrodes.*—

1. Dr. B. K. Ramprasad, M.A. (Hons.), D.Sc., M.I.E. (Ind.) (*Convenor*).
2. Mr. D. V. Krishna Rao, B.A.,
Mysore Iron and Steel Works.
3. One Chemist from the Mysore Paper Mills, Ltd., and
4. One from the Indian Institute of Science.

The progress of work done by this Committee was noted with satisfaction. Dr. Krishnaswamy said that at the Indian Institute of Science, experiments were being conducted at the instance of Government of India. The Chairman, Mysore Iron and Steel Works, pointed out that the experiments were being continued in the Iron Works as well.

It was resolved to request the Sub-Committee to get the results of experiments and to go into further details and to furnish a report to the Board as early as possible.

(10) *Manufacture of Soaps required by the Textile Mills.*—The Government Director, Industrial Concerns, explained that textile soap of good quality was being manufactured and supplied by the Government Soap Factory. It was decided to delete this subject.

(11) *Manufacture of Plastics.*—

Present Personnel.

1. Mr. V. Paul,
Indian Institute of Science.
2. Mr. Ahmedali,
Chemist, Indian Institute of Science.
3. Mr. M. Srinivasaiya, B.A., F.I.I.Sc.,
Indian Institute of Science.
4. Mr. V. Rama Rao, B.Sc.,
Government Electric Factory.

After reviewing the work of the Committee, the Chairman pointed out that the Government of India was also interested in this proposition. The Chairman, Iron and Steel Works, suggested that as the Pilot Plant is being erected at Bhadravati, he could try to manufacture formaldehyde there.

The Chairman showed to the Members two sets of samples of Bakelite product—one set made out of local powder prepared at Bhadravati, and the other with imported powder. The samples from the local powder were found to be as good as those from the imported one.

Dr. Krishnaswamy said that Dr. J. C. Ghosh, Director, Indian Institute of Science, had full information about Bakelite powder and plastics in general.

It was decided that the Sub-Committee should be requested to pursue the investigation further and also to consider the commercial aspect of the proposition.

(12) *Manufacture of Copper-wire, Galvanised Pins, etc.*—Since regular work had commenced at the Electric Factory, it was decided to delete the subject.

(13) *Manufacture of Tube Glass.*—The Chairman observed that this subject might be deleted as it was receiving the attention of Messrs. The Mysore Glass and Enamel Works, who anticipated no serious technical difficulties.

(14) *Manufacture of Chemicals, Drugs and Essential Oils.*—

Present Personnel.

1. *Sastravaidyapravina* Dr. S. Subba Rao, B.A., M.B.C.M., L.R.C.P. (Lond.),
M.R.C.S. (Eng.), D.P.H., Retired Senior Surgeon. (*Convenor*.)
2. Dr. B. T. Narayan, B.A., Ph.D., D.Sc., Bio-Chemist, Department of
Agriculture.

3. Mr. B. H. Krishna, M.Sc., A.I.C., Industrial and Testing Laboratory.
4. Dr. B. L. Manjunath, B.A., D.Phil., M.Sc., Professor of Organic Chemistry, Central College, Bangalore.
5. Dr. P. C. Guha, D.Sc. (Cal.), the Indian Institute of Science.
6. Dr. L. S. Doraswami, M.Sc. (Lond.), Ph.D., Economic Botanist.
7. Mr. M. S. Krishna Rao, Superintendent, Government Soap Factory.
8. Dr. M. N. Ramaswamy, M.Sc., D.Sc., Forest Research Chemist, Forest Research Laboratory.
9. Mr. B. Sanjeeva Rao, B.A., M.Sc. (Mad.), F.R.I.Sc., the Indian Institute of Science.

The Government Director, Industrial Concerns, pointed out that due to War, the cost of essential oils had gone up considerably and the imports had fallen off considerably. It was unanimously agreed that for such of the essential oils for the distillation of which raw materials are locally available, immediate steps should be taken to manufacture them after ascertaining the demand and commercial possibilities. The Board was of opinion that the cultivation of important herbs should be pursued. The Chairman pointed out that the cultivation of cinchona was being extended in the Kadur District. The Director, Sandalwood Oil Factory, suggested that geranium might be grown in the premises of the Sandalwood Oil Factory, as the sample oil distilled from the geranium grown experimentally in the Soap Factory compound was very good and better than the imported material and that the plants could be easily grown and there was a potential market in India for the oil at remunerative prices.

The Chairman finally observed that immediate attempts should be made to encourage private persons to grow geranium and the question of distillation taken up by the Sandalwood Oil Factory.

(15) *Manufacture of Cement Asbestos.*—

Present Personnel.

1. The Director of Geology in Mysore (*Convenor*).
2. Mr. S. G. Sastry, B.A., M.Sc. (Lond.), Director of Sandalwood Oil Factory
3. Mr. M. K. Narasimhan, B.A., Cement Factory, Bhadravati.

After reviewing the work done, the Chairman observed that this question might be dropped.

The question of disposing of the stock of asbestos in the Sandalwood Oil Factory, Mysore, was brought up by the Director of Sandalwood Oil Factory.

The Director of Industries and Commerce said that the existing stock (in the Sandalwood Oil Factory, and with the Director of Geology) might be converted into boiler composition—a simple industry—and at a later stage handed over to private enterprise. The Director, Sandal Oil Factory, said that about 50 tons were available in Mysore. The Director of Industries and Commerce promised to furnish very early the local demand for boiler composition.

(16) *Manufacture of Potassium Permanganate.*—The Director of Geology said that the work was in progress and that final report from the chemist on this special work was awaited.

(17) *Manufacture of Abrasive materials such as Corundum Wheels, Sand Paper, etc.*—It was decided to delete this subject.

(18) *Production of Cinchona.*—It was resolved that the report from Dr. M. N. Ramaswamy be placed before the Committee.

(19) *Manufacture of Water-proof fabrics.*—The Chairman observed that this subject might be left to the Textile mills.

(20) *Mixture of Petrol and Power Alcohol.*—This subject was also decided to be deleted.

(21) *Testing of Textile Samples.*—This subject was also decided to be deleted.

(22) *Sulphur*.—The Director of Geology was requested to expedite the work in connection with the location of sulphur in the State.

(23) *Manufacture of Copper-sulphate*.—Since the Mysore Chemical Manufactures, Ltd., have already been manufacturing this chemical in their works at Turbanahalli, it was resolved to delete this subject.

(24) *Manufacture of Sodium-bichromate*.—The Chairman wanted to know the progress with regard to the construction of buildings and the erection of plant.

The Government Director, Industrial Concerns, and Dr. Krishnaswamy explained the position and said that the work was progressing expeditiously.

II. The next subject considered was Dr. A. V. Varadaraja Iyengar's proposition with regard to the utilization of molasses for the production of potassium salts.

The scheme of Dr. Varadaraja Iyengar was examined. Dr. Krishnaswamy suggested that the question of Tartaric-acid manufacture could conveniently be taken up later, after investigating the availability of green tamarind and that in the meantime, the recovery of potash-salts from molasses might be taken up immediately. The Director of Sandalwood Oil Factory read out the discussion he had with Sir M. O. Forster regarding the advisability of taking up this scheme. Dr. Krishnaswamy further suggested that a sub-committee might be appointed to go into this subject and advise the Board.

The Chairman desired to know the working costs involved with full details.

It was finally decided to request Dr. Varadaraja Iyengar to furnish details with regard to cost, etc., to handle ten tons of molasses as an experimental measure, in the proposed Pilot plant, to be placed before the Committee at its next meeting.

III. The starting of a Glue Factory was the last proposition discussed. After a preliminary discussion, the Director of Industries and Commerce was requested to complete the necessary inquiries and get complete statistical information for being placed before the House at its next meeting.

It was the opinion of the House that this was a proposition in which the Mysore Tanneries, Ltd., should interest themselves.

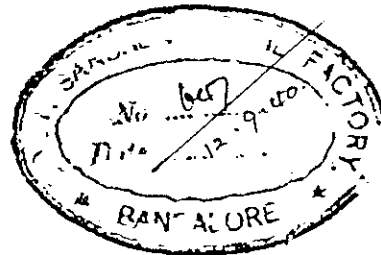
The Chairman thanked the members and the meeting terminated.

K. PARTHASARATHI,
Secretary.

N. MADHAVA RAU,
Chairman.

Date 11th Sep. 1940

*Brief this at
along with previous info
on the subject
at Bangalore during
my next visit
to discuss with
K. Parthasarathy Esq., B.A.,
Director, Sandal Oil Factory,
Mysore.*



Dear Sir,

I regret the delay in writing to you after the meeting on the inst. I am furnishing the information asked for, with further remarks, for your kind consideration.

I was required to provide information on the practical recoverability of potash from say 10 tons of molasses, so that the Government may know what they are committing themselves for. In recomputing the figures from the data on page 4 of the Note on the pilot plant operation for this process submitted by me earlier to the First Member of Council, it may be pointed out that the quantity of potassium sulphate for instance, would amount to 920 lbs. reckoning the potash content of molasses to be 3.0% K₂O. If it is 3.5%, another 150 lbs. would have to be added to this.

The quantities of various chemicals required for this item, would be approximate to (1) Tartaric acid-----1 ton and 2 cwts.; Calcium carbonate one-half ton of 100% purity; Calcium sulphate (Gypsum-pure) about one-half ton of 95% purity, on the basis that we are working at the rate of 3.0% K₂O in molasses. A slightly increased rate may have to be added to this theoretical reckoning. These quantities would suffice for the 10 tons of molasses when the process is in full and continued operation. Additional quantities will have to be provided for for the earlier trials before the 10 tons are treated in continuous operation.

It appears to have been suggested that a lesser quantity than 5 cwts. per day may be treated. To work 10 tons in batches of 5 cwts. per day it will take 40 days at a stretch. With lesser amounts the time involved will be longer. Moreover, I do not know if this will give us a reliable idea of the economy of the process. I shall be guided by the Government's requirements.

There appears to be a feeling ~~that~~ whether this amount ^(as asked for) would suffice normally and that more may not be demanded. I expect that under normal conditions, it ~~may not~~ ^{would be enough} recently however prices have gone a little high. When a place of operation were fixed upon, it will be my duty to ascertain the facilities usually available ^{very} and to plan my equipment subsequently. I shall await the directions of the Government.

Thanking you for your kind & courtesy,

Yours sincerely

A. Varadaraja Iyengar

Mr.K.Parthasarathi, B.A.,
XXXXXXXXXXXXXXXXXXXXXXXXXXXX

31/40-41

12th Sept. /40.

My dear Dr.Varadarajalingar,

I am in receipt of your letter dated 11th Sept
1940 giving me some information with regard to the
recovery of potash from molasses. I expect to be
in Bangalore next week and I shall discuss further
on this subject with you personally. In the mean-
while, please accept my thanks.

Yours sincerely,



Dr.A.V.Vararaja Iyengar, B.A., D.Sc., A.I.C.,
Biochemist, Indian Institute of Science,
P.O. Hebbal, (Bangalore).

EP:ATK)

Camp: Bangalore, 18/9/40

Sules.

Dr. Varadarajengar said
3 pm. tomorrow he will meet him &
that he would be glad to
receive the Dr. at the

J. I. S. S.

A. Krishna Rao
18/9

perused by Dr.

18/9

Engagement:-

3 pm at J. I. S. S. on 19/9/40

Pilot Plant for K_2SO_4 recovery from molasses.
to heat 5 cwt of molasses per day.

Place of operation. I.T.L. or Sugar Factory.

Cost of Equipment - 4 wooden barrels
of 40 cwt capacity. Rs 600/- as K_2SO_4 .

Precipitation of Cream of Tartar

+ subsequent recovery

6 drums of 45 gal capacity. " 50/-

Filter bags. " 10/-

3 wooden barrels of 45 gal capacity. 300/-

3 wooden tubs of 3 cwt. 15/-

Steam coils connection. 50/-

4 wooden tubs of 6 cwt. 50/-

Steam coils + connection. 75/-

Evaporator with coils to heat 100 gal liquor. 250/-

Tartaric acid reaction

3 wooden tubs + steam connection. 250/- of 40 gal

Treatment of lime lactate with H_2SO_4 .
lead line vessels 2 of 5 gal capacity. 400/-

Rs 2050
Centrifuges & presses 450

Rs 2500

Working expenses. to heat 10 tons of molasses.

Molasses to be supplied free for experimental work.

Chemicals

Half ton $Ca(OH)_2$ (sugar)

2 cwt of lime stone. in 2 lbs.

$CaSO_4$ (gypsum) etc labour

Rs 30/-

Rs 10/-

Rs 30/-

Rs 80/-

Rs 150

Cost of Sulfuric Acid

(to be ascertained)

Rs 180

Total 3300

Abstract
Equipment Rs 2500
Working expenses to heat 10 tons of molasses on an experimental scale. 350
Total 3000

or Rs 350

Ref:

Date 23rd Sep. 1940.

K. Parthasarathy, Esq., B.A.,
Director, Sandal Oil Factory,
M. S. O. R. E.

Dear Mr. Parthasarathy,

In continuation of our discussion at the Institute on the afternoon of the 19th inst. relating to the equipment required for carrying out the 5 cwt. pilot plant operation for recovering potash from molasses, I hoping to receive from you a copy of the draft of the discussion, as you once suggested, so that necessary alterations could, if required, ~~and~~ be made before your final report was submitted to the First Member of Council. The draft is perhaps on the way and may cross mine in transit. In anticipation of this, I had not taken notes of the cost we had fixed then.

back
I now write to bring a few items which we seem to have been missed that ~~afternoon~~ afternoon for inclusion under "Working". I remember we had made no provision for tamarind fruits although we did discuss the amount of tartaric acid required for the process. We might require all told 400 lbs. of the acid after allowing a loss of 112 lbs. to be made up after each operation. Reckoning at 3.0% tartaric acid on the green fruit, we would require 6 tons of the mature but green fruit to treat 10 tons of molasses. At 3.5% the same would come to 5 tons. I think we might get the fruits at the rate of 20 Rs. a ton. This will have to be included.

Briefed up after my return from Hassan to father's place
Again, there is the question of sulphuric acid required to regenerate the tartaric acid from ~~lime~~ lime tartrate. This last item would amount to 84 lbs. per day requiring in turn about 47 lbs. of 98% sulphuric acid, so that in all for 10 tons of molasses, nearly 17 cwts. of this acid will be necessary. In addition to this, a few preliminary experiments may have to be carried out to work up the optimum conditions. Provision for this will have to be made. I remembered these in the evening after I left you and when I recounted that day's discussion. Perhaps we had not sufficient time to go through all these. I must at my end regret the error.

In the working costs, we may have to make provision for employing labour for mechanical help. This may not be a serious matter but I thought I should take it to your notice.

I have nothing more to add. I hope it may now be possible for the Government to make the required allotment. Thanking you for your kindness, and with kindest regards,

I remain,
Yours sincerely,

sup
u
24/9/40
A. Varadaraja Iyengar

INDIAN INSTITUTE OF SCIENCE

Hebbal P.O. Bangalore
Department of Biochemistry

Ref. No.

Date 28th Sep. 1940

Dear Mr Parthasarathy

I had addressed you a letter on the 23rd inst. relating to the inclusion of a few items ^{under} the working scheme in the scheme relating to Potash separation from nitrates. I have so far not had any acknowledgment for the same. I write to enquire if you did receive it at all. If not, I shall host you a copy of it on hearing from you.

I thank you & with kindest regards,
Yours sincerely,
H. Harasim

Recd 30/9/40
on 28/9



K. Partha Sarathy ES/B-A,
Director,
Sandal oil factory,
Mysore.

Mr. K. Barthasarathi, B.A.,
XXXXXXXXXXXXXXXXXXXX

31/4/41

27th Septr. /40.

Dear Dr. Varadaraja Iyengar,

I am exceedingly sorry that your letter dated 23rd Septr. 1940 remained unacknowledged so far. I was out of station and returned only yesterday. I have been exceedingly busy. I had no time to confirm the discussion we had the other day. I expect to hand over charge here to Mr. Sastry on the 3rd afternoon, and shall be back in Bangalore, and shall attend to the subject matter of your letter.

Yours sincerely,



Dr. A.V. Varadaraja Iyengar, B.A., D.Sc., A.I.C.,
Biochemist, Indian Institute of Science,
Bangalore.

KP:ATK)

u
28/9/40

& Secretary,
Industrial Research Board.

No. 55/40-1

Encls: One file in original with
drawing *dz*

26th November

40.

Issued
26/11

Dear Sir,

With reference to my personal talk with you yesterday at the Board meeting, I am herewith sending the file relating to the manufacture of potash salts from molasses - a scheme put forward by Dr.A.V. Varadarajalingar, Biochemist, Indian Institute of Science.

Dr.Varadarajalingar has furnished an estimate for Rs.3,000/- to treat an experimental batch of 10 tons of molasses in a pilot plant.

I am directed to request you to be so good as to furnish your valuable opinion in the matter very early

The file may kindly be returned after perusal.

Yours sincerely,

Ed. K.Parthasarathi.

Dr.J.C. Ghosh, D.Sc., F.R.I.,
Director, Indian Institute
of Science, Bangalore.

No. 56/40-1 dated, 26th Novr. 1940.

HSR) Copy of the above is forwarded to Dr.A.V. Varadarajalingar, Biochemist, Indian Institute of Science, Bangalore for information, with a request ~~that~~ that he may interview Dr.Ghosh and explain the scheme.

Forwarded
26/11

dz

[Signature]
Secretary,
Industrial Research Board.

GOVERNMENT OF MYSORE.

INDUSTRIAL RESEARCH BOARD.

Estimate to put up a pilot plant for K₂SO₄ recovery from Molasses to treat 5 cwts. of molasses per day.

I. Place of operation: Industrial and Testing Laboratory or Sugar Factory.

II. Cost of equipment (precipitation of cream of Tartar and subsequent recovery as K₂SO₄)

4 wooden barrels of 40 cuft capacity	..	Rs. 600/-
6 drums of 45 galns. capacity	..	50/-
Filter Bags.	..	10/-
3 wooden tubs of 3 cu.ft.	..	15/-
6 wooden barrels of 45 galns.	..	300/-
Steam coils and connections.	..	50/-
4 wooden tubs of 6 cu.ft.	..	50/-
Steam coils and connections	..	75/-
Evaporator with coils to treat 100 galns. liquid.	..	250/-

Tartaric Acid extraction.

3 wooden tubs and steam connections (40 galns.)	..	250/-
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Treatment of lime tartrate with H₂SO₄.

Leadline vessels 2 of 5 galns. capacity.	..	400/-
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Total.	..	Rs. 2,050/-
contingencies .. and unforeseen	..	450

Total.	..	Rs. 2,500/-
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III. Working expenses to treat 10 tons of Molasses.

Molasses to be supplied free for experimental work.

Chemicals

Half ton Ca(OH) ₂	..	Rs. 30/-
2 cwts. of lime-stone 100% pure	..	10/-
CaSO ₄ (gypsum) etc.	..	30/-
Labour	..	80/-
cost of Sulphuric acid	..	180/-

Total	..	Rs. 330/- or 350/-
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Send a copy of this to Dr. H. V. S. 9/12

Abstract

The figures have been furnished by Dr. H. V. S. a personal discussion

I. Equipment etc.	...	Rs. 2,500/-
II. Working expenses to treat a batch of 10 tons of molasses on an experimental scale	..	350
III Contingencies	..	150

Total Rs. 3,000/-

SECRETARY.

was the first subject taken up for consideration. The Board took into account the several measures in force in British India and Indian States in the matter of the provision of industrial finance. The Board also took note of the rise and fall of the Tata Industrial Bank and other industrial investment corporations in India. It was generally admitted that the State aid to Industries Act in force in British India was somewhat inelastic to meet the requirements of industrialists, and the proposed Industrial Investment Corporation or Bank could not be expected adequately to meet the situation owing to certain limitations inherent in such an organisation.

The results of the policy of State aid pursued by the Government of Mysore during the past half a century were then reviewed. Account was taken of the capital invested by Government in certain "Key" industries and several large industrial concerns that had sprung up during the past many years directly as a result of the State aid. Opinion was unanimous that the present policy of Government was of a very liberal and far-sighted character comprehending all classes of industries—large-scale, medium sized, minor, rural and cottage industries—providing for the pioneering of basic and important industries, for making available cheap and ready industrial finance, grant of facilities and concessions in the form of supply of water and electric power at cheap rates, subscription to share capital of companies organized on joint-stock basis for purposes of development of industries, etc.

Messrs. Hayavadana Rao, S. G. Sastry, S. Hiriannaiya, B. K. Garudachar, E. V. Ganapati Iyer and a few others who spoke on the comparative merits of the present policy of State aid to industries and the proposed Industrial Investment Corporation, struck a common note that whereas the former was essentially developmental in character, the latter was predominantly a business proposition which was likely to subordinate the principle of development to profit-making and therefore was not likely to meet adequately the requirements of industries—Capital and Working Finance—in the present stage of industrial development in the State.

The Board finally adopted the decision that as the requirements of all classes of industries were, at present, being adequately met by Government under the policy of liberal State aid pursued by them and supplemented by the important Banks in the State, the need for starting a separate Industrial Investment Corporation was neither urgent nor keenly felt and therefore the question be dropped.

2. Starting of Laminated Wood Industry in Mysore.

The Chairman observed that the subject had been referred to the Chairman, Mysore Iron and Steel Works, for investigation and pending receipt of report from him; the consideration of the question be deferred.

3. Manufacture of White Cement and Refractory Fire Bricks.

The Director of Geology explained that the investigations conducted as regards the availability of magnesite in the State disclosed that these deposits were very limited and therefore the undertaking of the manufacture of fire bricks on a commercial scale was not a feasible proposition. The manufacture of white cement could, however, be tried on a very limited scale only if there is a good market for the product. It was resolved that the Director of Industries and Commerce may, in consultation with the Director of Geology, consider the application for facilities received in this connection on its merits and dispose of the same.

4. Apprenticeship Scheme.

In explaining the scheme, the Director of Industries and Commerce referred to the proceedings of the meetings of the Board held previously as also of the Sub-Committee and said that unemployment among educated young men, the present advanced stage of industrialisation, high efficiency required for industrial success and the dearth of trained workers, etc., rendered it increasingly necessary to bring into existence a scheme of apprenticeship for providing training in large scale industries both Government-aided and private. Trained workers were an asset to industrial concerns in these days of competition. In England, there was a well

developed apprenticeship scheme in operation. In Bombay also a scheme was in force for the past few years. It would be possible to organise such a scheme in the State, in the Government, Government-aided and important private concerns and with the assistance of the Stores Purchase Committee, training might also be arranged in firms outside Mysore executing their orders.

Mr. Nisbett observed that in the Bangalore Woollen, Cotton and Silk Mills Co., Ltd., they had in force a scheme of their own providing for apprenticeship training to children of their employees with a view to their recruitment as opportunities permitted.

Messrs. Hayavadana Rao, T. Ramachandra and a few others said that there was at present a dearth of trained workers, that the concerns had to spend considerably in affording initial training to raw people recruited for their work which they could not afford and opined that an apprenticeship scheme was urgently needed.

The Board was of the unanimous opinion that the industrial efficiency and success depended largely on trained workers available for work and having regard to the rapid Industrial development that had taken place in Mysore in recent years, it was desirable and necessary to bring into force a suitable scheme of apprenticeship providing for training educated, unemployed and persons belonging to artisan classes in the several classes of industries according to their needs and requirements. The Board further resolved that the Director of Industries and Commerce may be requested to pursue the question in consultation with the several large industrial concerns in the State and try to bring the scheme into force as early as possible.

5. Subjects arising out of the proceedings of the Industrial Research Sub-Committee.

The following two subjects arising out of the proceedings of the meeting of the Industrial Research Board were next taken up for consideration :—

- (1) Manufacture of Potash Salts by utilising molasses.
- (2) Manufacture of abrasive materials.

The scheme submitted by Dr. A. V. Varadaraja Iyengar of the Indian Institute of Science for the manufacture of potash salts by utilising molasses available at Mandya had been considered by the Industrial Research Sub-Committee, who had, after examining the details of the scheme, generally expressed in favour of undertaking the manufacture of potash salts from molasses on a semi-commercial scale as an experimental measure.

The Board, after discussing the industrial aspects of molasses and the feasibility of the scheme put forward by Dr. A. V. Varadaraja Iyengar, recommended the installation of a pilot plant at the Sugar Factory at Mandya or at the Industrial and Testing Laboratory for the manufacture of potash salts with molasses, on an experimental scale.

The Director of Geology mentioned that the investigations conducted and experiments made by Mr. P. S. Narayana, Consulting Industrial Geologist, regarding the manufacture of abrasive materials, such as sand or emery paper, etc., using local raw materials had shown encouraging results. The experimental manufacture of abrasive sheets had been successful and the products were found; after use, to compare favourably with imported ones in quality and price. Mr. Narayana had made proposals for the grant of a sum of Rs. 2,000—Rs. 1,500 of which was for setting up a pilot plant and Rs. 500 for working expenditure towards trying his scheme on a semi-commercial scale. The Director of Geology commended the scheme for favourable consideration.

The Board was of the opinion that in view of the encouraging results of the experiment, it was desirable and necessary that the work should be continued with a pilot plant to judge whether or not, the manufacture of abrasive materials would prove a good commercial proposition and therefore, a recommendation be made to Government to sanction, on such terms as the Government deem fit, the grant of Rs. 2,000 applied for by Mr. P. S. Narayana, Consulting Industrial Geologist, Bangalore, for setting up a pilot plant and verifying the results of his experiments on a semi-commercial scale.

ABSENT.

1. Mr. M. Venkatanaranappa, B.A.,
Chairman, Mysore Iron and Steel Works.
2. *Rajasabhabhushana Diwan Bahadur* K. R. Srinivasa Iyengar, M.A.,
Retired Member of Council and President, Mysore Silk Association.
3. *Rajamantrapravina Diwan Bahadur* K. Matthan, B.A.,
Retired Member of Council and Chairman,
Mysore Sugar Co., Ltd.
4. Mr. S. G. Forbes, B.Sc., E.E., (E. & M.E.), Mem. A.I.E.E.
Chief Electrical Engineer.
5. Mr. V. L. D'Souza, B.A., B.Com.,
Professor of Economics, Maharaja's College, Mysore.

The following Government Notifications were recorded :—

(1) No. D. 1457—I. & C. 82-40-2, dated 23rd September 1940, reconstituting the Board of Industries and Commerce with the personnel mentioned therein for a period of three years from 10th September 1940.

(2) No. D. 4620—I. & C. 121-39-6, dated 11th April 1940, nominating *Diwan Bahadur* N. N. Ayyangar as an additional member of the Board.

(3) No. D. 5117—I. & C. 121-39-7, dated 9th May 1940, nominating Mr. B. G. Appadorai Mudaliar, Director of Industries and Commerce *vice* Mr. M. S. Ramchendra Rao, retired with effect from 1st February 1940.

(4) No. D. 5982—I. & C. 663-39-2, dated 29th June 1940, nominating Mr. E. V. Ganapati Iyer, Government Director of Industrial Concerns as a Member, *vice* Mr. M. A. Sreenivasan.

(5) No. 5934—I. & C. 376-39-4, dated 27—28th June 1940, constituting an Industrial Research Sub-Committee.

(6) No. D. 2274—I. & C. 82-40-7, dated 19th November 1940, nominating Mr. S. K. Narasimhaiya, Secretary, Grain Merchants' Association, Bangalore, as a Member of the Board in place of the President of the Association.

At the outset, the Chairman made a reference to the passing away of *Diwan Bahadur* N. N. Ayyangar and said that the Board had lost a Member of wide experience.

In opening the proceedings, the Chairman referred briefly to the good work done by the Board during the last term and mentioned that, among the more important results achieved out of the deliberations of the Board, were the establishment of a plant at Belagola for the manufacture of bichromates and the starting of new lines of manufactures, such as galvanised pins and copper wire by the Government Electric Factory and Textile soaps by the Government Soap Factory. Another important development was the constitution of an Industrial Research Sub-Committee, both for co-ordinating research work carried on in several Government Departments and other institutions as well as for investigating into the possibilities of locally undertaking the manufacture of imported chemicals and semi-finished and other materials required by the Industries in Mysore with a view to making good, to the extent possible, the shortage of such materials created by War conditions. The Chairman observed that the several Research Sub-Committees set up were reported to be progressing with the specific lines of research of immediate industrial importance assigned to them and expressed the hope that their labours might yield useful results.

The Chairman then referred to the visit of the Roger Mission to the State with a view to ascertaining the present and potential industrial production and said that as recommended by them, arrangements had been made for obtaining and erecting an electric furnace and other equipment at Bhadravati for undertaking the manufacture of steel alloys.

Starting of an Industrial Investment Corporation in the State.

The question of providing finance required by the several large and medium scale industries in the State by the starting of an Industrial Investment Corporation

BOARD OF INDUSTRIES AND COMMERCE.

PROCEEDINGS OF THE MEETING OF THE BOARD OF INDUSTRIES
AND COMMERCE HELD IN THE LEGISLATIVE COUNCIL HALL
AT 2 P.M. ON THE 25TH NOVEMBER 1940.

PRESENT.

Rajamantrapravina N. Madhava Rao, Esq., B.A., B.L.,
First Member of Council. (Chairman.)

Ex-officio Members.

1. Mr. B. G. Appadorai Mudaliar, B.A., B.Sc., A.M.I., Mech.E.,
Director of Industries and Commerce in Mysore, Bangalore.
2. Mr. T. G. Rama Iyer, B.A.,
Director of Agriculture.
3. Mr. E. V. Ganapati Iyer, B.Sc.,
Government Director of Industrial Concerns.
4. Mr. C. E. Noronha, M.A.,
Secretary to Government, Development Department.
5. Mr. C. Abdul Jabbar, B.A.,
Chief Conservator of Forests.
6. Mr. B. Rama Rao, M.A., D.I.C., F.G.S.,
Director of Geology.
7. Mr. M. Abdul Hukh, B.A.,
Registrar of Co-operative Societies.
8. Mr. S. G. Sastry, B.A., M.Sc., F.C.S.,
Director, Sandalwood Oil Factory.
9. Dr. B. Sanjiva Rao, M.A., Ph.D.,
Professor of Chemistry, Central College.

Non-official Members.

10. Dr. J. C. Ghosh, D.Sc., F.N.I.,
Director, Indian Institute of Science.
11. *Rajacharitavisarada* Rao Sahib C. Hayavadana Rao, B.A., B.L.,
President, Mysore Chamber of Commerce.
12. Mr. S. K. Narasimhaiya,
Secretary, Grain Merchants' Association, Bangalore.
13. Mr. S. N. Ramanna, B.A., LL.B.,
President, Indian Planters' Association, Chikmagalur.
14. Mr. N. Nisbett,
Director, The Bangalore Woollen, Cotton
and Silk Mills Co., Ltd., Bangalore.
15. *Lokasevasakta* Rao Bahadur B. K. Garudachar.
16. Mr. T. Ramachandra, Bangalore.
17. Mr. M. Ramachandra Rao Sindhia, Bangalore.
18. *Rajasevasakta* S. Hiriannaiya, M.A., B.L.,
Retired Revenue Commissioner.
19. Mr. Mirza Azeezulla Beig,
Merchant, Bangalore.
- Mr. V. Venkatachar, M.A., B.Com.,
Assistant Director of Industries and Commerce (Secretary.)

6. Formation of an Industrial suburb.

Mr. Ramachandra Rao Sindhia, in proposing the formation of an Industrial suburb in Bangalore pointed out that there were a large number of small industrial establishments, such as flour mills, oil mills, foundries, etc., working in very congested parts of the City that most of these industries had been installed in badly ventilated and narrow houses and the health and safety of operatives working in such establishments were in grave danger. With a view to shifting these mills and housing them in properly constructed buildings, it was necessary to lay out an industrial suburb in a suitable locality on the outskirts of Bangalore, such as Magadi Road, Yeswantpur or Kempapur Agrahara.

The Director of Industries and Commerce in supporting the proposition said that the question was engaging the attention of the Bangalore City Municipality. The buildings in which most of the small mills had been housed were beyond repairs with the result that these mills had to be exempted from the operation of some of the provisions of the Factories Act, relating to ventilation, moving space, etc. The exemption is being continued for the past two years pending the formation of an industrial suburb to which these factories were proposed to be shifted.

A few members observed that the concerns working in the crowded parts of cities might find it difficult to shift their factories to the new industrial suburb owing to the large expenditure involved.

The Director replied that having regard to the nature of the factory buildings and danger to the health and safety of workers employed therein, the owners had either to improve their buildings or shift them to the proposed industrial suburb. But as the former was practically impossible, the latter was inevitable. The Director expressed the hope that the question of the formation of the Industrial suburb which was engaging the attention of the Municipality might soon become an accomplished fact. The Chairman observed that the question should be pursued expeditiously.

The Board in recognising the need for the layout of an industrial suburb, resolved that the question be commended to Government for favourable consideration and early action in view of the urgent need to shift most of the factories working in crowded parts of the City in badly housed, ill-ventilated and insanitary buildings in the interest of the health and safety of workers employed therein and the dwelling houses in their close proximity.

The Chairman thanked the members for their useful suggestions and the meeting came to a close.

V. VENKATACHAR,
Secretary.

N. MADHAVA RAU,
Chairman.

A. V. VARADARAJA IYENGAR, B.A., D.Sc., A.I.C.
BIOCHEMIST

Indian Institute of Science
Malleswaram P.O. Bangalore

Ref:

Date 6th December

K. Parthasarathy Esq., B.A.,
General Manager & Secretary, Industrial Research Board,
Government Electric Factory,
Mysore Road, BANGALORE CITY.

Dear Mr. Parthasarathi,

In pursuance of your ~~xxx~~ endorsement No. 55/40-41 dated 26th November last, I interviewed Dr. J.C. Ghosh on the 27th and 28th November. On both the occasions, he wanted me to report to him on the fermentability of the treated molasses. Although this process might work according to him as a War time problem, even without fermenting it to produce alcohol, he suggested this test to be carried out so as to make the Power-alcohol industry more stable and to place also the Potash industry on a more permanent basis during non-war times. I have carried out the same and enclose a copy of my report to him for your kind consideration and for the consideration of the Government. I hope the results will be convincing to you.

With kindest regards,

Acknowledged. 7/12/40.

1) Ackd.

2) To be submitted to

AYV/KR
The Chemist.

Along with the report.

after the receipt of the file from Dr. Ghosh.

Encl. One report.

Yours sincerely,

A. Varadaraja Iyengar

P. 21/40-1

7-12-40.

7/12.

REPORT ON THE FERMENTABILITY OF DEPOTASHED MOLASSES.

Fresh molasses and molasses treated with tartaric acid and subsequently neutralised were diluted to a specific gravity of 1050 and inverted with added sulphuric acid. Nutrients were added to the cooled solutions and the final solutions were inoculated with yeast acclimatised molasses medium. The reaction progressed well in both the cases with evolution of gas and the test solutions examined after 48 hours. Aliquots were distilled and alcohol estimated in the distillates. In both cases the various factors such as time, volume etc. were kept constant so that any change that may be observed could be traced to the treatment with reference to potash removal.

--- The results showed that the distillate from crude molasses had a Sp.Gr. of 0.99290 while that from treated molasses had a specific gravity of 0.99305.

In the latter case, the alcohol content is not very much different from the control under ~~same~~ comparative conditions. It may be added that no attempts were made to secure the optimum conditions in either case. Under comparative conditions, the alcohol content is not affected which is confirmed also by the fact that the sugar content does not undergo any modification as a result of the treatment.

5th December 1940.

M. K. S.

Potash File.

K

7/12

Industrial Research Board.

& Secretary,
Industrial Research Board.

7th December

Do 126/100-1

Dear Dr. Varadarajalingar,

I have just received your letter of the 6th instant,
together with a report forwarded therewith.

This is having my immediate attention and I shall
take up the matter further.

Yours sincerely,



Dr. A. V. Varadarajalingar, D.Sc.,
Bio-Chemist, Indian Institute of Science,
P.O. Hebbal, Bangalore.

HSR)

INDIAN INSTITUTE OF SCIENCE.

MALLESWARAM P. O., BANGALORE, INDIA.

J. C. GHOSH, D.Sc., F.N.I.,
DIRECTOR.

D/1744

TELEGRAMS :
" SCIENCE ", BANGALORE.
CODE : A. B. C. 5TH EDITION.

6th December 1940.

Dear Mr. Parthasarathy,

Kindly refer to your letter No.55/40-1 dated 26th November 1940. I have discussed the matter with Dr.A.V.Varadaraja Iyengar. I wanted to be sure that the molasses after treatment with tartaric acid ^{would} ~~will~~ yield residues which ^{could} ~~can~~ be fermented for the manufacture of alcohol. Dr.Varadaraja Iyengar has carried out experiments along this line and claims that the residue of the molasses after treatment with tartaric acid is as good as fresh molasses for the manufacture of alcohol.

I recommend that this scheme of putting up a pilot plant ^{No. 22/40-1} for the extraction of potassium from molasses as worked out by ^{7/12/40.} Dr.Varadaraja Iyengar may be taken up. In this connection I may point out that Dr.Varadaraja Iyengar expects an honorarium of about Rs.1,000/- for conducting the pilot plant investigations.

1) ack'd. The total expenditure, therefore will come to about Rs.4,000/-.
Acknowledged 7/12/40.

2) To be submitted to
The Chairman

Yours sincerely,

J.C. Ghosh

RB

with a note.

7/12.

K.Parthasarathy Esq., B.A.,
Secretary, Industrial Research Board,
Govt. Electric Factory,
Mysore Road, Bangalore.

Call back the

File

7/12

File Called Back

Do letter issued 7/12/40.

& Secretary,
Industrial Research Board.

Go 127 /40-41

7th December

40

Dear Sir,

I am just in receipt of your letter No.D.1744 dated 6th December 1940 furnishing your opinion on the scheme of Dr.A. V. Varadarajalingar re: the manufacture of potash salts from molasses. Many thanks.

I shall be obliged by your kindly arranging to return the original file of this Board forwarded to you with my letter No.55/40-41 of the 26th ultimo, since the same is required for urgent reference.

Yours sincerely,



Dr.J.C. Ghosh,D.Sc.,F.N.I.,
Director, Indian Institute of Science,
P.O. Hebbal, Bangalore.

HSR)

INDIAN INSTITUTE OF SCIENCE.

MALLESWARAM P. O., BANGALORE, INDIA.

J. C. GHOSH, D.Sc., F.N.I.,
DIRECTOR.

D/1752

TELEGRAMS:
"SCIENCE", BANGALORE,
CODE: A. B. C. 5TH EDITION.

9th December 1940.

Dear Sir,

With reference to your letter No.127/40-41 dated 7th December 1940, I enclose herewith the original file containing the correspondence relating to the manufacture of potash salts from molasses by Dr.A.V.Varadaraja Iyengar. I am sorry that this file was not sent to you by oversight with my previous letter.

Indram
Ack with Thanks
Jh
9/12/40. 9/12

Yours sincerely,
J. C. Ghosh

K.Parthasarathi Esq., B.A.,
Secretary,
Industrial Research Board,
Govt. Electric Factory,
Mysore.Road, Bangalore.

Secretary,

9th December

40

Do 183
40-1.

Dear Sir,

I acknowledge with thanks the receipt of your letter No.D.1752 dated 9th December 1940 together with this office original file re: manufacture of potash salts from molasses.

Yours sincerely,



Dr.J.C. Ghosh,D.Sc.,F.N.I.,
Director, Indian Institute
of Science, Bangalore.

Industrial Research Board.

& Secretary

10th December

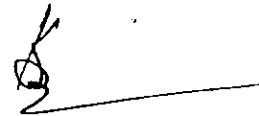
40

Do 134
46-1 Genl. one

Dear Dr. Varadarajalingar,

As desired by you, I am enclosing here-
with a copy of estimate ^{figures furnished by you} to put up a pilot plant for the
manufacture of potash salts from molasses ~~furnished by~~

Yours sincerely,



Dr. A.V. Varadarajalingar, D.Sc.,
Bio-Chemist, Indian Institute of
Science, Bangalore.

Secretary.

10th December

40.

Do 136
no-1

Dear Dr. Varadarajalingar,

I see in previous instances that one of the conditions governing the grant for experimental Works and other investigations is

"The results of investigations shall be the property of Mysore Government subject to the proviso that when these results are commercially exploited suitable compensation will be paid to the sponsor of the scheme."

I wish to know if you are agreeable to this condition.

I tried to get you over the phone half-a-dozen times, but unfortunately the clerk who took up the message did not respond to my request to call you up to the phone

Please reply per return of post.

Yours sincerely,



Dr. A.V. Varadarajalingar, D.Sc.,
Bio-Chemist, Indian Institute
of Science. Bangalore.

V. VARADARAJA IYENGAR, B.A., D.Sc., A.I.C.
BIOCHEMIST.

Indian Institute of Science,
Malleswaram, P.O. Bangalore.

Date 11th December 194

Ref:

31/40-1
12/12

K. Parthasarathy, Esq., B.A.,
General Manager & Secretary, Industrial
Research Board,
Govt. Electric Factory,
Mysore Road,
BANGALORE CITY.

Dear Mr. Parthasarathy,

I write to acknowledge with thanks the receipt of your D.O.
No. 134/40-41 dated 10th instant with enclosure containing a copy of
the costings we had prepared.

In acknowledging your D.O. 136/40-41 dated 10th instant, I
desire to state that I am agreeable to the condition set in, in the
first para of the letter. I only hope that when the process is
exploited commercially on the successful issue of this pilot plant
investigation, adequate monetary compensation will be recommended by
the Government of Mysore. I regret I have not perhaps made it clear
before, that it would be my endeavour to submit a full and accurate
report of the investigation. If the results are encouraging leading
to an economic working on a large scale, the report would include a
proposal for the same for the consideration of the Government.

In regard to the telephone affair, I regret you were incon-
venienced. I am bringing this matter to the notice of the Director.

Thanking you for the courtesy and with kindest regards,

I remain,

Yours sincerely,

R. Venkatasubramanian

RB
ackd with
thanks
12/12

AVV/KR.no. 153/40-1.
Acknowledged
13/12/40.

177/40-1

18th Decr. 0

Rajamantrapravina Diwan Bahadur
K. Matthan, B.A., Chairman,
Mysore Sugar Company, Ltd.,
Seshadri Road, Bangalore City.

Subject: Manufacture of Potassium Salts from Molasses.

I am directed to invite a kind reference to your letter of the 11th April 1940 to the First Member of Council and Chairman, Industrial Research Board, on the above subject.

The above proposition was discussed at the last Board meeting. Dr. Varadarajalingar, sponsor of the scheme has submitted an estimate for the pilot plant investigations for Rs. 3,000/- and he expects an honorarium of Rs. 1,000/- to conduct the pilot plant investigations. Dr. Ghosh, Director, Indian Institute of Science, to whom the scheme was referred for expert opinion, has recommended that the scheme of putting up a pilot plant for the extraction of potassium from molasses might be taken up.

I am therefore desired to request you to be so good as to kindly intimate the Board if the Mysore Sugar Company, Ltd., is willing to have the experiments conducted in the Factory at Mandya and to meet the cost involved.

Since the matter is urgent, I shall be exceedingly obliged for an early reply.

I have the honor to be,
Sir,
Your most obedient servant,


Secretary.



Copy of Government Letter No.D.5934/I&C.376-39-4 dated 27/28th June 1940 from the Secretary to the Government of Mysore, Development Department, Bangalore to the Director of Industries and Commerce in Mysore, Bangalore.

Subject: Formation of an Industrial Research Board
in Bangalore.

With reference to your letter No.336 dated 6th January 1940 I am directed to state that it will be sufficient for the present to appoint a small Sub-Committee to review the progress and co-ordinate the work of scientific and technical research which has been, or which may, from time to time, be taken up under the auspices of the Industries and Commerce Board. This Sub-Committee will have the following personnel:

The Member of Council in charge of Industries
and Commerce Portfolio CHAIRMAN.

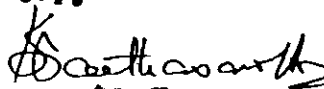
The Chairman, Iron and Steel Works.
The Director of Industries and Commerce.
The Director of Sandalwood Oil Factory.
The Government Director of Industrial Concerns.

Mr.K.Parthasarathi, Officiating Director of Sandalwood Oil Factory will be the SECRETARY OF THE Sub-Committee.

The cost of investigations approved by the Sub-Committee will ordinarily be treated as a part of the revenue expenditure of the institution or industrial concern specially interested therein. But where additional funds are required, the Sub-Committee may submit, for the consideration of Government, proposals for utilising the General Reserve of Industrial Concerns. The amount at the credit of this Reserve is ascertained to be Rs.1,24,000/-

sd. ~~George~~ ~~Makhan~~.
C. E. Moronha.
Secretary to Government
Development Department.

"Copy"


Secretary
Industrial Research Board.
Bangalore.

HSR)



TELEPHONE MESSAGE

From Mr. A. H. Varada
rajaiaengar

TIME OF RECEIPT OF MESSAGE:

Hour 12/30 P.M.

Date 19/12/60.

Requests to send a Copy
of the Profit & Loss Statement
worked out by him in Consultation
with the Secretary.

Informed him that after Verifying
the records, a Copy would be
sent if available

Subd to Secretary in
Person about this

Jh
19/12/60

Akbar Datar

Jh
20/12

Do 183

20th Decr

0

Dear Dr.Varadarajalengar,

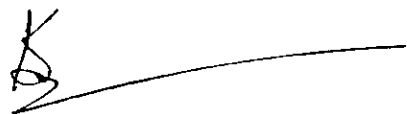
Referring to your telephone message of yesterday, I send herein enclosed a copy of cost of production and sales return re: potassium salts from molasses, furnished by you some time back.

Kindly acknowledge receipt.

Yours sincerely,

Dr.A.W. varadarajalengar,
D.Sc.,
Bio-Chemist, Indian Institute
of Science, Bangalore.





Cost of production and sales return furnished
by Dr.A.V. Varadarajalingar, Indian Institute of Science.

100 tons of molasses : 3.0%K₂O.

Theoretical yield of cream tartar. 12 tons.

yield realised ... 11 tons.

Tartaric acid required. ... 10 tons.

To cost of molasses:

By sale of 5.3 tons of

K₂SO₄ @ R240/-

... 1,272/-

To processes. Rs 11/-

By sale of gypsum

To cost of chemi-

5 tons @ R20/- 100/-

cals, lime stone. Rs 40/-

Sulphuric acid 500/-

To work estt. 64/-

To depreciation. 145/-

Total. 760/-

1,372/-

, Copy'

Secretary,

Industrial Research Board.

INDIAN INSTITUTE OF SCIENCE

Malleswaram P.O. Bangalore cit.

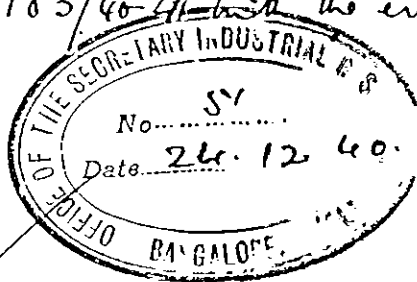
Department of Biochemistry

Ref. No. _____

Date 21st Dec. 1940

Dear Mr Parthasarathy,

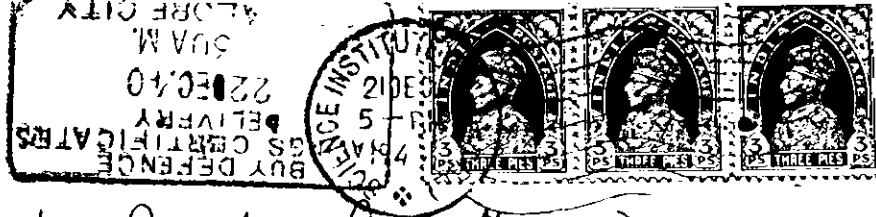
I write to acknowledge with thanks
your D.O. 183/40-41 with the enclosure contained
therein.



File

ref

Yours sincerely,
N. Parthasarathy



K. Pantha Parathi Esq. B.A;
Secretary,
Industrial Research Board,
Mysore Road,
Bangalore

TEL. ADD. :
"MYSUGAR"

FACTORY :
MANDYA (MYSORE STATE)

THE MYSORE SUGAR COMPANY, LTD.

CODES USED :
A.B.C. 5TH EDN. & BENTLEY'S

TELEPHONE NO. 2133
"SANTHI BHAVAN"
SESHADRI ROAD

YOUR REF. No 177/40-1

BANGALORE. 23rd Decr. 1940.

OUR REF. No. C-19/253

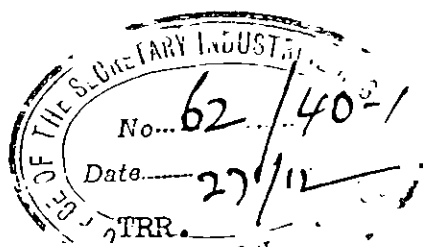
The Secretary,
Industrial Research Board,
BANGALORE.

Dear Sir,

-- Manufacture of Pottasium Salts from
Molasses.

We thank you for your letter dated
the 18th December 1940.

We shall be glad if you will kindly
return to us the connected papers sent
by us with our letter dated the 11th April
1940 addressed to the First Member of Council
and Chairman Industrial Research Board.



Yours faithfully,
THE MYSORE SUGAR CO. LTD.

(Signature)
SECRETARY.

No. 220/40-1

Acknowledged

(Signature)
21/1/41.

TEL. ADD.:
"MYSUGAR"

FACTORY:
MANDYA (MYSORE STATE)

THE MYSORE SUGAR COMPANY, LTD.

CODES USED:
A.B.C. 5TH EDN. & GENTLEY'S.

TELEPHONE No. 2133
"SANTHI BHAVAN"
SESHADRI ROAD

YOUR REF. No. BANGALORE. 4th Jan. 1941,
OUR REF. No. C-19/5253

The Secretary,
Industrial Research Board,
BANGALORE.

Dear Sir,

Manufacture of Pottasium salts from
Molasses.

We have not received the papers
relative to the above subject called for
in our letter No.C-19/5253 dated the
23rd December 1940.

Kindly have the same sent on

*The papers
may be sent
immediately* to us immediately as we have to discuss
the matter with Dr. Varadaraja Iyengar.



Yours faithfully,
THE MYSORE SUGAR CO. LTD.

K. R. Pullagar
SECRETARY.

TRR.

*The file is returned today.
2 & 7 letters to Sugar Co. subd
separately. 1/3 6-1-41*

No. 243/401
our file in original

6th January 1

The Secretary,
Mysore Sugar Company, Ltd.,
Seshadri Road, Bangalore City.

xxx Dear Sir,

Subject: Manufacture of Potassium Salts from
Molasses.

With reference to your letter No.C-19/5509,
dated 4th January 1941, on the above subject, I
send herein enclosed the original file of papers
sent by you to the First Member of Council.

Kindly acknowledge the receipt of the papers.

Yours faithfully,


Secretary.

TEL. ADD. :
"MYSUGAR"

FACTORY :
MANDYA (MYSORE STATE)

THE MYSORE SUGAR COMPANY, LTD.

CODES USED :
A.B.C. 5TH EDN. & BENTLEY'S

TELEPHONE NO. 2133
"SANTHI BHAVAN"
SESHADRI ROAD

YOUR REF. NO.

BANGALORE. 7th Jan. 1941.

OUR REF. NO. E-19/

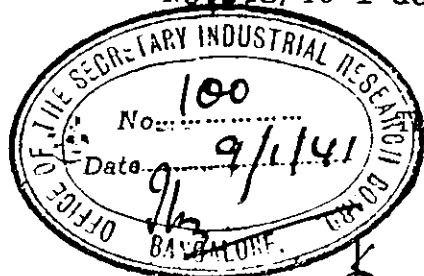
557

The Secretary,
Industrial Research Board,
BANGALORE.

Dear Sir,

Manufacture of Potassium salts
from Molasses.

We acknowledge, with thanks, the
receipt of the file of papers relative
to the above subject, sent with your letter
No. 243/40-1 dated the 6th January 1941.



TRR

Yours faithfully,
THE MYSORE SUGAR CO. LTD.

(Signature)
SECRETARY.

Salt. To. The Secretary

This letter
will be issued
now, if off

Mrs. Susan A. L. L.
Bangalore 41

Secy, 27/1/41

Re: Your letter no. 8.19/5587
8-1-41.

Subj: Utilization of Rances for
the recovery of Potash
Salt.

I am directed to report you
to be so good as to expedite your
reply to this office letter of no. 177
40-1
8-18-12-40, on the above subject

You may
accept for
some time
more.

10/1/41

J. L.

27/1
Secy.

BOARD OF INDUSTRIES AND COMMERCE,

Bangalore, dated.....193 .

No.
ENCL.

From

R. ANANTASUBRAMANYAM, ESQ., B.A., B.L.,
Secretary, Board of Industries & Commerce,
Bangalore.

To

SIR,

I am directed to forward herewith a printed copy of the
proceedings of the meeting held on
for your information.

I have the honour to be,
Sir,
Your most obedient servant,

Secretary.

No. 344/40-1

URGENT.

23rd Jany. 1

The Secretary,
Mysore Sugar Company, Ltd.,
Bangalore City.

Refce: Your letter No.e-19/5587 dated 7th Jany.41.
Subject: Utilisation of Molasses for the production of Potassium salts.

I am directed to request you to be so good as to expedite your reply to this office letter No.177/40-1 dated 18th December 1940 addressed to your Chairman on the above subject.

I have the honor to be,
Sir,
Your most obedient servant,

Sd/ 16/2.

SECRETARY.



TEL. ADD.:
"MYSUGAR"

FACTORY:
MANDYA (MYSORE STATE)

THE MYSORE SUGAR COMPANY, LTD.

CODES USED:
A.B.C. 5TH EDN. & BENTLEY'S

TELEPHONE No. 2133
"SANTHI BHAVAN"
SESHADRI ROAD

YOUR REF. NO.

BANGALORE, 27th Jan. 1941.

OUR REF. NO. E-19/

6167

The Secretary,
Industrial Research Board,
Mysore Road,
BANGALORE.

Dear Sir,

Re. Manufacture of Potassium salts from
Molasses.

With reference to your letter No.344/
40-41 dated the 23rd January 1941, we write
to inform you that we have asked Dr. A.V.
Varadaraja Iyengar to give us his definite
plans and drawings on the above subject.
As soon as we get his reply, the matter
will be placed before the Board, and its
decision will be communicated to you
in due course.

Yours faithfully,
THE MYSORE SUGAR CO. LTD.

L. M. Allagar
SECRETARY.



Received
10 days
hence.

No. 486/401

28 Feb. 1941

1

The Secretary,
Mysore Sugar Company, Ltd
Bangalore City.

Re: Manufacture of Potassium salts from Molasses.

I am directed to invite a kind reference to your letter No.E-19/6167 dated 27th January 1941 on the above subject, and to request that the matter may kindly be expedited. I request you to let me know how the matter now stands.

I have the honor to be,
Sir,
Your most obedient servant,


Secretary

THE MYSORE SUGAR COMPANY, LTD.

TEL. ADD.:
"MYSUGAR"

CODES USED:
A.B.C. 5TH EDN. & BENTLEY'S

"SANTHI BHAVAN"
SESHADRI ROAD

BANGALORE, 3rd March 19 41.

REF. NO. E-19/ 7277

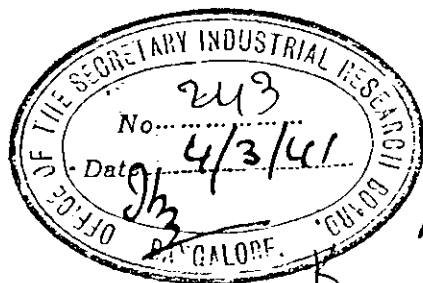
The Secretary,
Industrial Research Board,
BANGALORE. (Mysore Road)

Dear Sir,

Manufacture of Potassium salts from Molasses.

We thank you for your letter No.486/40-1 dated
the 28th ultimo on the above subject.

Dr. Varadaraja Iyengar had not furnished us
with the details regarding the design and equipment of
the pilot plant for the recovery of Potassium salts from
Molasses. He has since furnished the same. We have forwarded
these details to our General Manager with a view to find out
the probable cost of putting up this pilot plant and we are
awaiting his reply in the matter.



TRR.

Yours faithfully,
THE MYSORE SUGAR CO. LTD.

(S. R. Pallagani)
SECRETARY.

Acknowledges

4/3

A. V. VARADARAJA IYENGAR, B.A., D.Sc., A.I.C.
BIOCHEMIST.

To, K. Parthasarathy Esq. B.A.,
Secretary, I. R. B.
Bangalore City.

Ref:

Indian Institute of Science,
M A L L E S W A R A M, P.O.,
B a n g a l o r e C i t y.

Date 14th March 1941

Dear Mr. Parthasarathi,

Subsequent to my reporting to you about the fermentability of the
depotashed molasses early in December last, I had visited the Mandya Sugar
Factory at the suggestion of the Chairman of the Company in the first
of January, in connection with finding the space available in the factory
and ^{that} required for carrying out the pilot plant trials for recovering po
from molasses. I was required at the end of that month to submit a deta
plan and drawings for the purpose so that they could make an accurate
ing and submit the same for ^{the consideration of} their Board. I submitted finally a plan of
layout as I imagined, on the 10th Feb. last i.e. just over a month ago.
had no acknowledgment for this nor any communication as to the decis
arrived at by their Board. I daresay they have had sufficient informat
to enable them to make their decision. I may add for your information t
the units of apparatus which you and I had costed in September last, had
undergone some changes as will be seen in the following;

14/3

Equipment suggested to the I.R.B.		
Wooden vats	40 c.ft.	4
"	6 "	4
"	3 "	3
"	100 gals.	1
"	45 "	10
"	40 "	3
Leadlined vessels		2

Equipment suggested to the Mysore Sugar Co.	
Wooden vats	25 c.ft.
"	8 "
"	2 "
"	100 gals.
"	45 "
Leadlined vessels	2

You will see that the cost of the ~~xx~~ equipment does not increase on
account of this modification. I do not know if you have heard from them. I
understand that they have not yet got the costings estimated. It is real
pretty long time, since the Board of Industries resolved to test the pr

With kindest regards,

Yours sincerely

A. V. Varadaraja Iyengar

A. V. VARADARAJA IYENGAR, B.A., D.Sc., A.I.C.
BIOCHEMIST

Indian Institute of Science,
M A L L E S W A R A M, P.O.,
B a n g a l o r e C i t y.

Ref:

Date ¹⁴ 14TH March 1941.

CONFIDENTIAL.

Dear Mr. Parthasarathy,

Recently, the Mysore Sugar Co., had advertised for sale some filterpresses. I took the opportunity of bringing to the notice of Rajama trapravina Dewan Bahadur K. Mathan, Esq., Chairman and Managing Director of the Sugar Co., the fact that these might be required in the event of the pilot plant trials for the recovery of potash proving successful and economical. I was cautious in ^{doing} ~~this~~ ⁱⁿ that this preliminary trial has not yet been commenced, but ~~that~~ we should not find it difficult later on for want of these equipments. You are aware that such equipments cannot be had in India nor could be imported from abroad. I am satisfied with having this brought to your kind notice. Please treat this matter as confidential.

I had met just this morning Sir M.O. Forster who kindly made enquiries on the development of this process. When I mentioned this he felt much grieved as a valuable source of the potassium compounds, not being tapped in time.

With kindest regards,

K. Parthasarathi, Esq., B.A.,
Secretary, Industrial Research Bureau,
B a n g a l o r e C i t y.

Yours sincerely,

M. L. Narasimhaiah

K
14/3 . 265
14/3

534

20th March 1

2

The Secretary,
Mysore Sugar Company, Ltd.,
Bangalore.

Refce: Your letter No.E.19/7277 dated 3rd March 41
re: Potassium salts from Molasses.

I am directed to inform you that in the Board meeting held on 15th March 1941, the Chairman remarked that the Mysore Sugar Company should be requested to expedite its views in the matter.

I am to request you therefore kindly to expedite matters and to intimate the decision of your Board ~~at an~~

early date

No. 589/60-1

Reminder

21/4/41

I have the honor to be,
Sir,
Your most obedient servant,

[Signature]
Secretary.

[Signature]

FACTORY :
MANDYA (MYSORE STATE)

THE MYSORE SUGAR COMPANY, LTD.

CODES USED :
A.B.C. 5TH EDN. & BENTLEY'S

TELEPHONE NO. 2133
" SANTHI BHAVAN "
SESHADRI ROAD

YOUR REF. NO.

BANGALORE, 22nd April 1941.

OUR REF. NO. E-19/

8776

K. Parthasarathi Esq., B.A.,
Secretary, Industrial Research Board,
B A N G A L O R E.

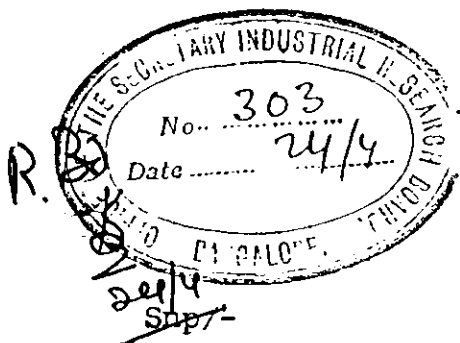
Dear Sir,

Potassium Salt from molasses

With reference to your letter No.589 of the 21st instant, we are awaiting our General Manager's report and estimate for the pilot plant. We are sending him a reminder today and will write to you on ^{bearing} ~~receiving~~ from him.

Yours faithfully,
THE MYSORE SUGAR CO. LTD.,

(Signature)
SECRETARY.



Lo 621
40-1

29th April

1

Dear Sir,

Refce: Manufacture of potassium salts from molasses.

I append below*for your kind perusal an abstract of correspondence between this office and the Mysore Sugar Company and beg to state that in the last Board meeting the Chairman stated that the Mysore Sugar Company be requested to expedite their views in the matter.

Yours sincerely,



Rajamantrapravina Diwan Bahadur
K. Matthan, B.A., Chairman,
Mysore Sugar Company, Ltd.,
Bangalore City.

*

- 1) This office letter No.177/40-41 dated 18-12-40 on the above subject.
- 2) Letter No.C.19/5253 of 23-12-40 of the Secretary, Sugar Co, requesting to send their connected papers.
- 3) No.C.19/5509 of 4-1-41 of the Secretary, Sugar Co, reminder for the above.
- 4) This office letter No.243/7-1-41 - forwarded the records.
- 5) No.E.19/5587 of 7-1-41 - acknowledged the papers sent
- 6) This office letter No.344/23-1-41 - reminder to kindly expedite the reply.
- 7) No.E.19/6167 of 27-1-41 of the Secretary, Sugar Co, intimates that the decision of their Board would be intimated in due course.
- 8) This office letter No.486/28-2-41 - reminder.
- 9) No.E.19/7277 dated 3rd March 41 of the Secy, intimates that the General Manager's report & costs etc, is awaited.
- 10) This office letter No.534/21-3-41 - reminder.
- 11) This office letter No.589/21-4-41 - reminder.
- 12) Letter No.E.19/5776 dated 22nd April 41 of Sugar Co, - intimates that the report and of the General Manager is still awaited and reminder is issued to him.

Lo 621 ---
40-1

29th April

1

Dear Sir,

Refce; Manufacture of potassium salts from molasses.

I append below*for your kind perusal an abstract of correspondence between this office and the Mysore Sugar Company and beg to state that in the last Board meeting the Chairman stated that the Mysore Sugar Company be requested to expedite their views in the matter.

Yours sincerely,



Rajamantrapravina Diwan Bahadur
K. Matthan, B.A., Chairman,
Mysore Sugar Company, Ltd.,
Bangalore City.

*

- 1) This office letter No.177/40-41 dated 18-12-40 on the above subject.
- 2) Letter No.C.19/5253 of 23-12-40 of the Secretary, Sugar Co, requesting to send their connected papers.
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- 7) No.E.19/6167 of 27-1-41 of the Secretary, Sugar Co, intimates that the decision of their Board would be intimated in due course.
- 8) This office letter No.486/28-2-41 - reminder.
- 9) No.E.19/7277 dated 3rd March 41 of the Secy, Sugar Co intimates that the General Manager's report re: costs etc, is awaited.
- 10) This office letter No.534/21-3-41 - reminder.
- 11) This office letter No.589/21-4-41 . reminder.
- 12) Letter No.E.19/5776 dated 22nd April 41 of the Secy, Sugar Co, - intimates that the report and estimate of the General Manager is still awaited and that reminder is issued to him.

CONFIDENTIAL

INDUSTRIAL RESEARCH BOARD.

PROCEEDINGS OF THE THIRD MEETING OF THE INDUSTRIAL RESEARCH BOARD SUB-COMMITTEE HELD ON TUESDAY THE 13TH MAY 1941 AT 1 P.M. AT THE CHAMBERS OF THE FIRST MEMBER OF COUNCIL.

PRESENT.

Rajamantrapravina N. Madhava Rau, Esq., B.A., B.L.,
First Member of Council (*Chairman*).

MEMBERS.

1. Mr. M. Venkatanaranappa, B.A.,
Chairman, Mysore Iron and Steel Works, etc., Bangalore.
2. Mr. S. G. Sastry, B.A., M.Sc. (Lond.),
Director, Sandalwood Oil Factory, Mysore.
3. Mr. E. V. Ganapati Iyer, B.Sc.,
Government Director, Industrial Concerns, Bangalore.
4. Mr. K. Parthasarathi, B.A.,
General Manager, Government Electric Factory,
Bangalore (*Secretary*).

ATTENDED BY INVITATION.

Mr. M. Venkatesa Iyengar, M.A.,
Secretary to the Government of Mysore,
Development Department, Bangalore.

ABSENT.

Mr. B. G. Appadurai Mudaliar, B.A., B.Sc., A.M.I., M.E.,
Director of Industries and Commerce in Mysore, Bangalore.

Agenda.

(Deferred subjects in the last meeting held on 15th March 1941.)

- (1) Compilation of information *re* Industrial Researches in the State.
- (2) Scope and functions of the Research Board.
- (3) Consideration of subjects proposed by—
 - (a) Government Director, Industrial Concerns—Manufacture of Glass bulbs, silkworm gut, etc.
 - (b) Director of Industries and Commerce—Suggesting that certain items of researches taken up by the Government of India may also be taken up here.
 - (c) General Manager, Government Electric Factory—Utilisation of steel shavings.
 - (d) Manager, Mysore Spun Silk Mills, Ltd., Channarayana—Manufacture of bobbins, shuttles, etc.
 - (e) Dr. A. V. Varadarajaiengar, B.A., D.Sc., A.I.C., Indian Institute of Science—Manufacture of starch from sweet potato.
- (4) Any other subjects brought forward by the members.

Opening the proceedings of the regular meeting, the Chairman referred to the agenda already circulated to members. Subject No. 1 on the agenda, *i.e.*, compilation of information *re* Industrial Researches in the State was taken up for consideration.

1. **Compilation of information *re* Industrial Researches in the State.**

The note as also the statement of Industrial Researches engaging the attention of Government, Government-aided, and important private institutions in the State recently compiled had been circulated to the members. It was explained that this brief survey was undertaken to know the position of Industrial Researches in progress and likely to be taken up.

The Chairman observed that such of those items which are not of industrial importance might be eliminated and the rest pursued.

2. **Scope and Functions of the Research Board.**

The next subject taken up for consideration was the Scope and Functions of the Board.

Referring to the note circulated to members on this subject, the Chairman remarked that Government had very recently renamed the Board as "**The Board of Industrial Planning and Co-ordination**" and that Mr. M. Venkatanaranappa was appointed as the Vice-Chairman and that the Board had also been entrusted with the work relating to civil production.

Mr. S. G. Sastry pointed out that one of the important suggestions in the note was the separation of the Research Branch of the Government Industrial and Testing Laboratory. It was felt that this question might be taken up some time later.

3. **Manufacture of Glass Bulbs, Tubes and Rods for Electrical Lamps.**

The subjects proposed by the Government Director of Industrial Concerns were then taken up for consideration.

Mr. E. V. Ganapati Iyer stated that this subject had already been discussed at the Board of Industries and Commerce meeting held on 30th April 1941.

4. **Manufacture of Silk Worm Gut.**

Mr. E. V. Ganapati Iyer explained that this research problem was an important one and that it was desirable to investigate the question of the manufacture of Silk Worm Gut, in view of the assured demand by the Medical and Army Departments. He also stated that this substance was manufactured at present in only one place, *i.e.*, Kollegal in the Madras Presidency.

Messrs. S. G. Sastry and M. Venkatanaranappa stated that Mr. H. S. Govinda Rao, Superintendent of Sericulture, and Mr. K. Shamshuddin Khan, Manager, Mysore Spun Silk Mills, Ltd., might have some information about this.

After discussion, the Chairman observed that the Director of Industries and Commerce might be requested to have this question investigated immediately in detail through the Department of Sericulture and to favour the Board with a detailed note *re* the facilities available locally, plant and equipment required, demand, cost of production, etc., for further consideration. The Chairman also stated that the appointment of a Sub-Committee as proposed by the Government Director of Industrial Concerns was unnecessary.

5. **Manufacture of Acid-resistant Earthenware or Porcelain.**

Mr. E. V. Ganapati Iyer pointed out the immediate necessity to take up this line of manufacture at the Government Porcelain Factory and stated that preliminary experimental work had been started at the Factory.

The Chairman enquired how sulphuric acid was being transported at present. Mr. Ganapati Iyer stated that jars supplied by Messrs. Parry & Co., were being used.

The following resolutions were then adopted:—

(1) *That the Government Porcelain Factory might expeditiously pursue the investigations.*

(2) *That the General Manager of the Factory might consult Dr. B. Sanjeeva Rao of the Central College and Mr. Chinto Panth in the matter.*

(3) *That this Board also recommends that the General Manager of the Factory might be deputed to Messrs. Burn & Co., Calcutta, to study the technique and other details re the manufacture.*

6. Manufacture of Formaldehyde, Hydrogen Peroxide and Potassium Chlorate.

Mr. E. V. Ganapati Iyer explained his proposals in this behalf. Since Formaldehyde plant had been installed at Bhadravati and that regular manufacture would soon commence, it was felt that there was no necessity to take up the manufacture of this chemical at the Government Industrial and Testing Laboratory.

Mr. M. Venkatanaranappa stated that Messrs. Mysore Chemical Manufactures, Ltd., have been manufacturing hydrogen peroxide.

Thereupon, after some discussion, the Chairman remarked that since a private manufacturing concern had already taken up the manufacture of this chemical, there was no necessity to take it up at the Industrial and Testing Laboratory.

The question of the manufacture of potassium chlorate was taken up for consideration.

Mr. E. V. Ganapati Iyer pointed out that the price of potassium chlorate had gone up considerably and that there was a great demand for this chemical in Match Industry.

The Chairman desired to know whether there was any definite demand for this chemical and sufficient raw materials and facilities were available locally.

Mr. M. Venkatanaranappa stated that there was a good demand for this chemical from the Match Factory at Shimoga and others in South India as well. He was of opinion that it was worth while taking up the manufacture of this chemical, provided sufficient raw materials are locally available.

The sense of the meeting was that the note on this subject was vague, rendering it difficult to arrive at definite decision.

The Chairman therefore suggested that Mr. S. G. Sastry might be requested to draw up a note explaining the availability of raw materials, demand, financial implications, etc., and the particular advantage we have to take up the manufacture of potassium chlorate, for early consideration of the Board.

7. Manufacture of Electrolytic Cells.

The desirability to investigate the manufacture of electrolytic cells was urged by Mr. E. V. Ganapati Iyer.

Mr. S. G. Sastry stated that experiments *re* cathode and anode were conducted at Bhadravati. Mr. M. Venkatanaranappa said that experiments on graphite electrodes were conducted at Bhadravati and the results of experiments were very encouraging and that further work was being continued as resolved in the last meeting. There was general discussion *re* the several kinds of cells needed.

Thereupon it was resolved that the subject might be referred to the Graphite Electrodes Sub-Committee for detailed investigation and report, confining the scope of enquiry to such of those cells which Mysore Industries require and for which there was a definite demand.

The appointment of a separate Sub-Committee was considered as unnecessary.

8. Investigation of certain items of Researches.

The suggestion of the Director of Industries and Commerce to take up any of the following investigations already taken up by the Government of India Board of Scientific and Industrial Research was then taken up for consideration.

- (1) Development of Essential Oil Industry, particularly relating to soaps, as the imports of such oils have been cut off from abroad.
- (2) "Sulphation" of Indian vegetable oils important to Textile Industry.
- (3) Manufacture of lubricants, greases, soluble oils from castor oil.
- (4) Utilisation of vegetable oils mixed with mineral oils as lubricants and for diesel fuel.
- (5) Production of "fortified vegetable oils" containing vitamins.
- (6) Manufacture of Margarine.

With regard to Item 1—Development of Essential Oil Industry—it was pointed out by the Chairman that the cultivation of essential oil bearing plants and cultivation of medicinal herbs, etc., had already been discussed and considered in detail and the matter should be pursued further and the Director of Agriculture and the Chief Conservator of Forests in Mysore requested to take up the matter of cultivation.

The possibilities of the cultivation of pyrethrum was then taken up for discussion. The Chairman pointed out that previous experiments at the Forest Research Laboratory gave an indication that the plants did not grow well in Bangalore and suggested that its cultivation might be attempted at Kemmangundi.

The Chairman suggested that the Chief Conservator of Forests might be requested to send a detailed note on the possibilities of growing pyrethrum and vetiver in the State.

The Chairman said that with regard to the remaining items 2 to 6, such as the manufacture of lubricants, margarine, etc., noted above, the results of investigations of Government of India might be awaited.

9. Utilisation of Steel Shavings.

The Chairman observed that the steel shavings available in the several workshops in the State might be sent to the Mysore Iron and Steel Works, Bhadravati for being used.

Incidentally, the Secretary to Government, Development Department, suggested that an index of subjects discussed from the commencement of the Board might be prepared to facilitate further action. This was agreed.

10. Manufacture of Bobbins, Shuttles, Paper-tubes, Travellers, etc., required by the Textile Industries.

Referring to the note on the subject circulated to members, the Chairman stated that it was an important subject and pointed out that for the present, the Board might confine only to the manufacture of bobbins from suitable species of wood indigenous to Mysore.

It was also noted that some experiments on this subject were in progress at the Forest Research Laboratory, Bangalore.

The Chairman observed that the Sub-Committee suggested in the note might be constituted. Mr. M. Venkatanaranappa said that Dr. H. S. Sharma need not serve on the Sub-Committee since paper tubes, etc., would not be taken up immediately.

A Sub-Committee with the following personnel was decided to be constituted and the subject referred for its investigation and early report.

Personnel.

- (1) The Chief Conservator of Forests in Mysore.
- (2) Mr. B. K. Murthy, B.E. (Mech.), M.Sc., Tech., A.M.C.T., Principal, Sr. Krishnarajendra Silver Jubilee Technological Institute, Bangalore.

very much lower immediately locally manufactured formaldehyde was available on a larger scale.

Mr. M. Venkatanaranappa promised to look into the details of costs.

The Chairman remarked that the entire quantity of bakelite powder now manufactured at Bhadravati should be earmarked to the Government Electric Factory irrespective of costs.

The meeting then terminated.

K. PARTHASARATHI,
Secretary.

N. MADHAVA RAU,
Chairman.

- (3) Dr. S. A. Kabir, M.Sc., D.Sc. (Munich), Forest Research Laboratory, Bangalore.
- (4) Mr. Pullman, Works Superintendent, Mysore Spun Silk Mills, Ltd., Channapatna.
- (5) Dr. M. N. Ramaswamy, M.Sc., D.Sc. (Munich), Technical Assistant to the Chief Conservator of Forests. (Convenor).

11. Manufacture of starch from sweet potato.

A short note on the subject prepared by Dr. A. V. Varadarajaiengar had been circulated to members. The Chairman invited reference to this note. Discussions then ensued.

The Secretary stated that there was good demand for starch by the textile and paper industries.

Mr. M. Venkatanaranappa stated that if the quality of the starch was good, the matter was worth while pursuing. The Secretary also stated that the quality was found to be fairly good. Mr. M. Venkatanaranappa was of opinion that it was advisable to consider the question of having a pilot plant for collecting valuable manufacturing data.

After further discussion, the following resolutions were adopted.

(1) *That the note of Dr. A. V. Varadarajaiengar on the manufacture of starch from sweet potato be referred to Dr. J. C. Ghosh, D.Sc., F.N.I., Director, Indian Institute of Science, Bangalore, for favour of his remarks.*

(2) *That Dr. Varadarajaiengar might be requested to submit a modified scheme with sketch, apparatus and other plant and equipment required, financial implications, etc., for a pilot plant operations, for consideration of the Board.*

At this stage, the Chairman questioned as to what had happened to the scheme on the manufacture of potassium salts from molasses submitted by Dr. A. V. Varadarajaiengar.

The Secretary replied that the matter had been referred to the Mysore Sugar Company, Ltd., as previously decided and that in spite of several reminders, they had not yet intimated their views. The Chairman observed that the Mysore Sugar Company, Ltd., should be requested to expedite action.

12. Manufacture of Furfural and Laminated Sheets.

The Secretary stated that at the Plastics Sub-Committee meeting held on the 10th May 1941, Mr. Paul of Mysore Iron and Steel Works was requested to prepare two schemes on the manufacture of Furfural and Laminated sheets.

The two schemes since received were placed before the Committee for discussion.

The Secretary pressed for a grant of Rs. 750 for Furfural experiments and Rs. 5,000 for the first stage of experiments of Laminated sheets. Mr. S. G. Sastry while explaining the importance of these experiments, stated that the Board might be pleased to sanction the grants.

The Chairman observed that the Mysore Iron and Steel Works would arrange to find funds and conduct experiments on the manufacture of Furfural. It was also resolved that Mr. M. Venkatanaranappa might be requested to examine the other scheme for the manufacture of Laminated sheets.

At this stage, Mr. M. Venkatanaranappa stated that the Government Electric Factory seems to have complained about the price of bakelite powders manufactured at Bhadravati. He was of opinion that the entire production should be earmarked to the Government Electric Factory.

Mr. E. V. Ganapati Iyer was of opinion that the cost of the powder was very much higher and that the Government Electric Factory being a commercial concern would not be able to fight competition in the market, if powder costs are put up. Mr. S. G. Sastry stated that the Mysore Iron and Steel Works have at present been handicapped on account of the price of phenol and formaldehyde being purchased elsewhere and that manufacturing costs of powder ought to be

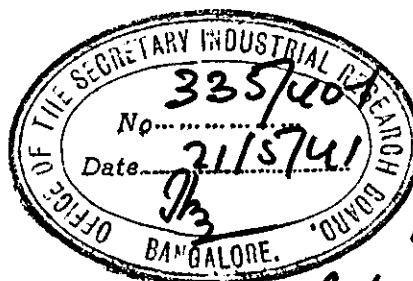
THE MYSORE SUGAR COMPANY, LTD.

TEL. ADD.:
"MYSUGAR"CODES USED:
A.B.C. 5TH EDN. & BENTLEY'S"SANTHI BHAVAN"
SESHADRI ROAD

REF. No. _____ E-19/

BANGALORE, 20th May 1941

9586

The Secretary,
Industrial Research Board,
Mysore Road,
BANGALORE.

NO. 650/40-1
Acknowledged
2/5

Dear Sir,

Manufacture of Potassium salts from Molasses.

With reference to the correspondence ending with your letter No.621/40-1 dated the 29th April 1941, we enclose herewith, for your information, copy of a letter No.G-7126 dated the 17th inst. received from our General Manager at Mandya, submitting a final estimate for the cost of installing an experimental plant for the recovery of Potash from Molasses.

The matter will be placed before the Board very shortly and its decision will be communicated to you in due course.

Yours faithfully,
THE MYSORE SUGAR CO. LTD.

Mr. R. Pallegar
SECRETARY.

*Secy's wish
Dr. A.V.V. has also recd a copy of the
enclosed note. He had interviewed
me. I have discussed with him in
the matter. He has promised to send
a note clarifying the position. wait for
a few days"*
ENC. ONE.
TRR.

Jh 26/5/41.

Copy of letter No.3-7126 dated 10/17 May 1941 from General Manager, Mysore Sugar Co. Ltd., Mysore.

Re. Recovery of potash from molasses.

Referring to the correspondence we have had on the above subject, I now submit final estimates for the cost of building an experimental plant and give approximate cost for the recovery of potash sulphate by this plant as well as on a commercial scale.

The estimate for the cost of the pilot plant is based on the discussions our Mr. Raghunathaiah had with Dr. Varadaraja Iyengar, during his visit to Bangalore. To reduce costs old steam drums and barrels have been substituted. It was decided that small filter presses could be required and that the presses available in the factory could be too large for the purpose. It is proposed to use wood presses manufactured locally. Two hand pumps will also be required to force the liquors through the presses. These would have to be of bronze construction.

I have included in the cost of equipment 2 cwt. of tartaric acid. We have estimated that this will be the quantity required for experimental purposes. We cannot assume theoretical quantities as the quantity is bound to be lost during the trials. The rate given for this material is ex-London. A quotation for the material to be obtained before a decision is made on the experiments. After experiments have been completed the tartaric acid will have no value to us.

The statement enclosed shows the cost of the experimental plant to be Rs.2,582/-. It would be in position to start the experiments are completed, the value of the recovery of potash is estimated to be Rs.920/-.

The estimated cost of working this plant is Rs.9/11/0, as is shown in the detail estimate. It is charged for supervision as it is understood that Dr. Varadaraja Iyengar will remain here and conduct the experiments. The material consumption is calculated according to the figures by Dr. Varadaraja Iyengar and some allowance has been made in the estimate. The exact quantity of tartaric acid covered will have to be determined and the exact quantity of sulphuric acid used for recovering the excess tartaric acid in precipitating cream of tartar, will also have to be determined more exactly. The replacement quantity of tartaric acid has been taken as 0.3%. This is a theoretical figure and is affected by the loss of calcium tartrate by solution. The quantity of the lime used during the experiments has been put at 2,000 lbs.

Rs.40/- per ton. A lower grade lime can be suitable in scale plant.

The daily production of Potash Sulphate is expected to be 45 lbs.

At the present stage, it is difficult to estimate cost of 1 ton of Potash Sulphate on a commercial scale process. I have attempted this and given the results in the accompanying commercial plant. I have assumed a plant of 10 tons of molasses per day and have based costs on an 80% recovery has been taken as 7 tons potash per 100 tons. The cost of the plant as Rs.10,000/-. The quantities of materials consumed are proportionate to those given by Iyengar.

Certain differences in quantities and prices of materials in commercial plant as against the experimental plant will be noticed. It is proposed to use a low grade lime at a lower cost of Rs.20/- per ton. This type of lime should show to advantage in the use of oxide, carbonate and sulphate. It may prove, however, to contain too much grit which might have an excessive corrosive action on tanks and pumps. Steam and power costs have been considerably reduced due to efficient use of the steam by proper designed and insulated vessels. Labour costs will also be considerably reduced as the plant will be more mechanical. The supervision and other expenses are self explanatory but it will be noted that nothing has been added for contingencies.

The estimated cost of producing one ton of Potash Sulphate by this process is herewith 282/5/0 P.O.R. andya. The present Indian price but of five London quotation is Rs.250/- per ton. Assuming pre-war cost of materials, the cost of production could be reduced by Rs.25-0-0 per ton.

It will be seen from the estimates submitted that the process does not hold out any promise of being a practical proposition. The recovery of the tartaric acid by the use of sulphuric acid is very costly and further experiments should be tried on a larger scale process. It is suggested that a portion of the distilling loss might replace some of the sulphuric acid, but a definite claim that the costs would be reduced sufficiently. The exact quantity of tartaric acid lost in process has been estimated at 0.3%. This is a figure that would require careful checking as the material is expensive and any increase would greatly increase the production costs.

The one advantage of the process as demonstrated by the laboratory experiments is that it yields a white, crystalline product which would find a ready sale and is easily packed and transported.

COPY.

THE LYONS & CO. LTD.
W. R. Pallegar
SECRETARY.

COPY.

RECOVERY OF POLARISER FILM CLASS 13.

Experimental Plant at Mandya:

Cost of Equipment:

One - Shed - 23 ft. x 21 ft.	New	..	Rs.655/-
Two - filter presses (wood)	"	..	500/-
Two - Hand pumps	"	..	250/-
Five $\frac{3}{4}$ old steel drums		..	25/-
nine - old wood barrels		..	45/-
One - copper pan	New	..	30/-
Lead, steam & water piping & Erection		..	500/-
Brick piers for tanks		..	150/-
Tartaric acid - 2 cwts. at Rs.1-14-6 per lb.			427/-
Total.			2,582

Cost of operation per day.

Materials:

Lolasses	..	6 cwts.	..
Sulphuric acid. 56 lbs. at Rs.185/- per ton			Rs.4 10 0
Tartaric acid- $\frac{1}{2}$ lb. at Rs.1-14-6 alb.			0 15 3
Lime - 28 lbs. at Rs.40/- per ton.			0 8 0
Steam and power			2 2 9

Labour:

3 men			1 8 0
Total.			9 12 0

Commercial Plant.

Lolasses - 14.3	..		..
Sulphuric acid 23 cwts. At Rs.185/- per ton			212 12 0
Tartaric acid- $11\frac{1}{2}$ lbs. at Rs.1-14-6 a lb.			22 0 0
Lime - $11\frac{1}{2}$ cwts. at Rs.20/- per ton.			11 8 0
Steam and power	..		12 13 0
Labour	..		3 6 0
Supervision	..		4 0 0
Depreciation	..		5 2 0
Office expenses	..		1 0 0
Bagging and selling	..		9 4 0
Total			282 5 0

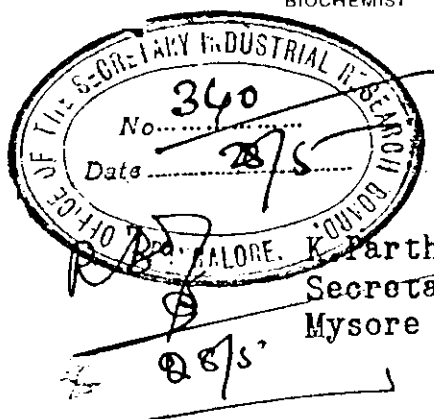
THE MYSORE SUGAR CO. LTD.

H. N. Pallagani
SECRETARY

TRR/20-5-41.

A. VARADARAJA IYENGAR, B.A., D.Sc., A.I.C.
BIOCHEMIST

Indian Inst
B a n g a



Ref:

Date 28th May 1941.

Mr. Parthasarathi, Esq., B.A.,
Secretary, Industries Research Board,
Mysore Road, Bangalore City.

Dear Mr. Parthasarathi,

In continuation of my personal talk with you on Saturday last I am enclosing herewith a copy of my note on the estimate of the General Manager of the Mandya Sugar Factory.

There is one matter which calls for immediate attention and this relates to the ^{high} price of sulphuric acid, which is the limiting factor in the adoption of the process for recovering potash from molasses according to my ~~present~~ I do not know if it ~~is~~ is too premature to bring this matter to the notice of the Government, as otherwise the possibility of the industry is ~~is~~ negatived on the high cost of sulphuric acid alone. While there is a way out of the difficulty, I should think this matter must be considered even now. In my view, if the Mysore Fertilisers and Chemicals Ltd. should produce tartaric acid and form a combine to produce potassium sulphate, the margin of profit is large and ^{can} could be adjusted as they will, interested in giving sulphuric acid at lower rates than that quoted for the outside market and demand. If necessary, I shall clarify my point later.

In my letter of the 4th May 1940, to the First Member of Council ^(along with the Pilot Plant no.) I had indicated that I ^{desired} would like to be paid a remuneration of 1200/P for carrying out this trial. In my recent talk with Mr. Matthan, I understood from him, that I may have to take up this question with the Government. I do not know if the remuneration has been included in the ~~the~~ ^{the} fee.

estimate sent by you. I do not know if I have to ~~Ø~~ address the Member again on *this point*. I am sure you would kindly look into this matter to my advantage and do the needful.

Thanking you and with kindest regards,

Yours sincerely,

A. Karwarji

Encl. one.

Ref:

Date 28th May 1941.

Rajamantra Pravina

Diwan Bahadur K. Matthan, Esq., B.A.,
Chairman and Managing Director,
Mysore Sugar Co., Ltd.,
Bangalore City.

My dear Sir,

Recovery of Potash from Molasses.

In continuation of our discussion on Saturday the 24th inst. on the General Manager's Estimate for the pilot plant trials as contained in his letter No. 7128 dated 10/17th May 1941, I desire to bring the following for your kind consideration.

According to the General Manager, the cost of production per ton of sulphate is over 280/-Rs. while the market can make available a product the same name to the value of 250/-Rs. per ton quoted in London at the moment. He therefore considers that the process offers no possibility for being undertaken by the Factory. This is the main issue although there are ^{other} ~~minor~~ items such as the quantity of sulphuric acid required, tartaric acid to be ^{with} bought, which I shall deal subsequently.

In the first place, the comparison in costs between two products of different grades of purity is an unhappy feature. It may at once be pointed out that the ~~of~~ imported material is a crude one intended for fertiliser purposes while the salt produced hereunder is quite pure. A comparison of the prices for commodities of the same quality will show that ~~the~~ chemically pure potassium sulphate was quoted in Europe before the war, as early as 1935, at 425/- per ton, which if translated to Indian market would be priced at at least 550/- per ton. At the moment the ^a price is much higher. It is evident that the cost of production in this process stands to better advantage. Secondly, it

biggest item in respect of cost. It is not possible to replace it by any other acid for reasons best known to Chemists. Sulphuric acid is a basic component from which other acids are derived and therefore the cheapest of all other acids. Further, with the employment of sulphuric acid only, we can eliminate the ~~intere~~ introduction of soluble mineral compounds. In all chemical industries as well as those like the present one, ~~where~~ where an acid is to be derived in the pure state (here tartaric acid is to be recovered for treating fresh quantities of molasses) it is normal to derive it in the form of ^{its} calcium salt from which it is secured by treatment with sulphuric acid, a fact with which you are fully conversant. In view of this procedure, the consumption ^{in sulphuric acid} is more than that theoretically required. It seems however necessary ^{to remark} that in the estimate, the quantity of acid provided ^{for} is much larger than needed. While a provision is made for about 23 cwts. and more, I wish to point out that the quantity should not exceed more than 1 ton under normal circumstances, so that the cost should correspondingly be lowered. This alteration should be kindly noted. The reckoning made in the estimate for the commercial plant is simply a multiple of the trial figure and assumes a replication of the ^{operation} plant so many times, so that an error introduced in the latter is correspondingly multiplied.

The high consumption of the acid over that required for producing the potassium sulphate is accounted for in the calcium sulphate produced from the lime tartrate. For every ton of potassium sulphate produced, the total quantity of calcium sulphate (Gypsum) realised from lime tartrate will be 29 cwts, of which half (14½ cwts.) ^{is} are used for converting potash into the sulphate while the other half accumulates itself. This is an item which has a market provided the material is pure enough. It is therefore advantageous to employ a pure lime or li-estone in preference to an impure one which

has been presumed that the potassium sulphate to be produced according to the process under consideration is only to be intended for manurial purposes so that a comparison of costs of the material available on the market is that if produced here certainly is a deterrent to undertaking the trials. It may however be argued that there is no necessity to produce such pure stuff from the viewpoint of costs. Unfortunately, in the process under consideration by employing two crude materials such as molasses and tamarind extract, we are able to secure a chemically pure compound from which the potassium sulphate is derived in a pure condition. While cost of producing this compound should as far as possible be kept at a low level, it certainly stands comparison with the corresponding pure compound imported. Even in respect of fertiliser applications, a pure chemical has in its favour both quantity and less quantity to be applied. Our supplies of potash are mostly from Europe, particularly Stassfurt Deposits in Germany. This industry, if adopted now, will supply a limited need and will make us selfsufficient. About the quality of the product, the General Manager's testimony should speak for itself. I hope I have tried successfully to bring an adequate comparison of the prices so that you could appreciate better the differences in price of the imported product with that to be produced here.

It would not be out of place here to mention that the demand for pure potash salt for chemical industries, is still to be met, such as the production of potassium bichromate, potassium chlorate for matches, caustic potash and other salts of potash.

It would appear that the present ruling price for the fertiliser product is somewhere at 350/Rs. per ton/as pointed out by your Secretary.

The ^{quantity} cost of sulphuric acid as indicated in the estimate is perhaps too

generally should not contain more than a ^{half} ~~per cent~~ of ~~the~~ calcium silicate. Further, with the use of impur lime, not only the quantity of sulphuric acid required is enhanced, but the resulting product is impure and increases in quantity also without finding a market. As has been indicated, the presence of grit will affect the pumps.

The only item remaining to be considered ~~now~~ is that of tartaric acid which in view of the high price now must be replaced by tamarind extract, be made from tamarinds, which are available in abundance in the State at quite cheap rates. The cost will then be less than half when it is secured in the season.

In concluding this note, I wish to indicate that the high price of sulphuric acid is the only limiting factor in adopting this process. While it is true that the salt of an acid is costlier than the acid itself, the use of larger quantities of the acid should be accounted for by the disposal of the ^aremaining products, in this case, gypsum. This fact, has therefore be brought to the notice of the Industries ~~Research~~ Research Board and of the Government. I hope that this fact alone will not deter the company from carrying out this trial, which if found successful will be ^anew venture in the whole world. The credit goes then to you, Sir, and to the Sugar company.

I end this note with a rough cost of production as ^{Corrected} ~~envisaged~~ by me, ^{expressed} ~~explained~~ and appended separately. I hope I have ~~explained~~ myself clearly.

Thanking you and with respectful regards,

I remain,
Yours sincerely,

M. P.

Copy to the Secretary, Industries Research Board, with reference to his queries on the estimate from the Sugar Company.

M. Venkatesh Kumar

Production of Potassium Sulphate l.w.

Capital, 1 l.

Melass	15 ctns	P. c. f.
Sulphuric Acid	1 ton @ 150/-	150 c. f.
Tartaric Acid (100% d. w.)	(25 lb. @ 100/-)	15 c. f.
Lime		15 c. f.
Lubrication & maintenance		7 c. f.
Depreciation (on 100% @ 10%)		2 c. f.
Manufacturing cost		9 c. f.
Steam & Power		1 c. f.
	J. 100/-	<u>21.5 c. f.</u>

In realisation by sale of
3/4 ton of potassium sulphate @
40 P. per ton
(European price 100% d. w.)
the ton at 40 £ per ton)

Net C. f. 21.5 c. f.

A. V. VARADARAJA IYENGAR, B.A., D.Sc., A.I.C.
BIOCHEMIST

Indian Institute of Science,
Malleswaram, P.O.

Ref:

Date. 4th June 1941

PERSONAL.

K. Parthasarathy, Esq., B.A.,
Secretary, I.R.B.,
Mysore Road,
Bangalore City.

Dear Mr. Parthasarathy,

I am enclosing herewith a copy of my letter addressed to ^{letter} the Chairman, The Mysore Sugar Company for your information ^{on continuation of my previous}

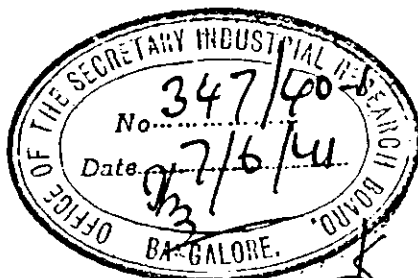
My own feeling in the matter is that the Company is not willing to finance the Pilot Plant trials. If they ask me to assign the Patent with all the rights in the State for inducing them to conduct the trials, this suggestion is to say the least "outrageous" ^{and unheard of.} I do not know if the Industries Research Board would be willing to finance the trials in view of the fact they approved of the scheme in the first instance. In case your Board or the Government do not wish to conduct the trials, I should be free to take it up with the Sugar Company at a later date. *Kindly acknowledge receipt.*

Thanking you for your kind advice,

Yours sincerely,

AVV/KR.

Encl: One.



Acknowledges

7/6/41. : 2/6

A. V. Varadaraja Iyengar

A. V. VARADARAJA IYENGAR, B.A., D.Sc., A.I.C.
BIOCHEMIST.

Indian Institute of Science,
M A L L E S w A H A M, P.O.,
B a n g a l o r e C i t y.

Ref:

Date 4th June 1941.

The Chairman, ~~and Managing Director,~~
Mysore Sugar Co., Ltd.,
Bangalore.

Dear Sir,

I write to thank you for kindly affording me an opportunity to meet the Directors of your company in connection with the pilot plant trials in recovering potash from molasses.

I understood ~~the~~ your Board to suggest at the meeting a procedure, which is substantially as follows; 1. That I should assign my patent on potash recovery to your company with exclusive rights to operate the same in the State, for which consideration, they would allow me to conduct the trials in their factory, at their expense, mainly to ascertain if my process could be profitably worked on a large scale;

2. That during the period of trial and later if and when the sugar company adopts this process, I am to expect no other remuneration or consideration from them, beyond the opportunity provided for me to conduct the trials in the factory; and

3. That in your Board's opinion, this arrangement of allowing me to work in the factory in connection with these trials would constitute a sufficient consideration by itself for my assigning my patent to them.

I am obliged to your secretary for advising me of the substantial correctness of this impression over the phone.

I am aware that the company has to incur a possible unreturnable ex-

diture of nearly 2000 Rs. in case the experiments prove a failure, but in my own view, the chances of making ^{to process} ~~it~~ commercially profitable are quite large so that the trial is worth making even as an experiment. I certainly cannot be expected to forego my entire rights for an inducement to the Sugar company to expend this small amount for a trial.

Further, when the pilot plant scheme was approved, I was required by Secretary, Industries Research Board to assent to the following condition:

"The results of the investigation shall be the property of the Mysore Government, subject to the proviso that when these results are commercially exploited, suitable compensation will be paid to the sponsor of the ~~research~~ schemes"

While the present endeavour is to know if the process can be profitably undertaken based on pilot plant trials as approved by the Government

I am referring this matter to the Industries Board as I have assented to the condition, quoted above. I may add that the suggestion of your Board is in striking contrast with the condition of the Government. It is probable that the Government may allot some money for the trials, if they feel that the trial is worth undertaking. I am leaving it to the Board of Industries, for such action as they may deem fit.

I shall also be obliged to you to kindly inform me of the position in respect of these trials as it stands after your Board's decision, a copy of which may kindly be sent to me.

Thanking you for the courtesy,

I remain,
Yours faithfully,

Copy with best compliments to the Secretary, Indian Research Board for information and advice. // // - P 1

A. leucodactylus

4-6-41

687/407

13th June

1

The Secretary,
Mysore Sugar Company, Ltd.
Bangalore City.

Subject: Manufacture of potassium salts.

In inviting a kind reference to your letter No.E.19/9586 dated 20th May 1941 on the above subject, I am directed to request you kindly to intimate the decision of your Board at an early date.

This may kindly be treated as Immediate.

I have the honor to be,
Sir,
Your most obedient servant,


Secretary.

HS 2)



THE MYSORE SUGAR COMPANY, LTD.

TEL. ADD.:
"MYSUGAR"CODES USED:
A.B.C. 5TH EDN. & BENTLEY'S"SANTHI BHAVAN"
SESHADRI ROADREF. NO. E-19/
10267

BANGALORE, 14th June, 1941.

The Secretary,
Industrial Research Board,
Mysore Road,
BANGALORE.

Dear Sir,

Manufacture of Potassium Salts.

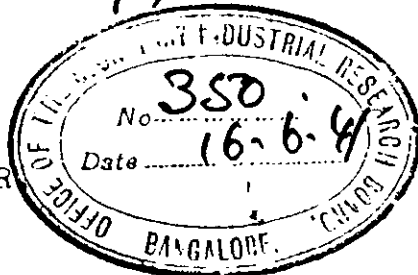
We thank you for your letter No.688/40-41 dated the 13th inst. The above subject was considered at the Board meeting held on the 3rd instant, at which Dr. Varadaraja Iyengar was also present. The Board wished to know to what extent Dr. Varadaraja Iyengar was prepared to share with the Sugar Company any benefits that may arise as a result of the experiments. We have communicated this to Dr. Varadaraja Iyengar who wanted some time to think over, and are awaiting his reply in the matter.

1) Ack with
Thanks

If off, Dr. A.V. will be requested
to expedite his reply to the Sugar Co.

Yours faithfully,
THE MYSORE SUGAR CO. LTD.

K. R. Pallegar
SECRETARY.



TRR

2/3
16/6/41.

Do 71894001 *in file*

Dear Dr. Varadarajalingar,

Subject: Potassium Salts.

Refce: Your D.O. letter of the 4th instant.

Referring to the above, I write to inform you that the Secretary, Mysore Sugar Company writes to me that the Board wished to know to what extent you were prepared to share with the Company any benefits that may arise as a result of the experiments and that he had written to you about this, for which he is awaiting your reply. Evidently, what you have stated in your letter under reference seems to be at variance with the views of the Company. I hope with this information you will now be able to reply the Company suitably, so that I may hear from them definitely in the matter.

Yours sincerely,



Dr. A.V. Varadarajalingar, B.A., D.Sc.,
Indian Institute of Science,
B a n g a l o r e.

(Board of Industrial Planning and Coordination.)

24th June

1

726/401

The Secretary,
Mysore Sugar Company, Ltd.,
Bangalore City.

Sub: Manufacture of Potassium salts.

Referring to your letter No.E.19/10267 dated 14th June 1941 on the above subject, I am directed to request you to be so good as to intimate whether a reply has since been received by you from Dr.A.V. Varadarajalingar and if so what the decision of the Board is.

I request the favour of immediate action.

I have the honor to be,
Sir,
Your most obedient servant

HSR)


SECRETARY.

A. V. VARADARAJA IYENGAR, B.A., D.Sc., A.I.C.
BIOCHEMIST

363.
25/6/41

Indian Institute of Sci
M A L L E S W A R A M, P
B a n g a l o r e C i t

Ref:

Date 23rd June 1941

K. Parthasarathi, Esq., B.A.,
Secretary, I.R.B.,
Bangalore City.

R.B.S.
25/6

Dear Mr. Parthasarathi,

Recovery of potash salts from molasses.

With reference to your D.O. 710/40-41 dated the 19th inst. in respect of the above subject, I wish to clear one misapprehension that may arise out of the letter from the Secretary, Mysore Sugar Co., Ltd., If the Board of Directors had not denied the question of monetary benefit to me arising out of their possibly taking over this process at a later date, much of the unpleasantness would have been removed. As it is, when they wanted me to hand over the patent rights to them for no financial advantage to me, as will be clear from my letters to the Sugar Co., (Copies enclosed), I had wanted time to consider this unique suggestion with my friends and wellwishers. Since, the Secretary had in his recent letter indicated that what was talked about ^{in the Board meeting} should not be taken to mean any suggestion even, I am at a loss to understand what is required of me. I am meeting the Chairman at my request to clarify the issue. I hope that something may definitely crystallise out of this talk. I shall be happy to keep the Board informed of further developments. I expect that in normal circumstances, something definite will issue out of this.

Thanking you,

Yours sincerely,

A. Varadaraja Iyengar

This will
be
awaited
Sugar Co
advised
yesterday.

2/3
25/6/41
Encls. Copies of letters.

Indian Institute of Science,
M A L L E S W A R A M, P.O.,
B a n g a l o r e C i t y.

6th June 1941.

The Chairman,
Mysore Sugar Co., Ltd.,
Seshadri Road,
Bangalore City.

Dear Sir,

Recovery of potash from Molasses.

I have for acknowledgment your Secretary's letter No.E/10019 of the 5th instant.

The suggestion of your Directors at the meeting as stated in my last letter, viz., that of assigning the patent rights to the Company for no consideration other than the permission to conduct the proposed trials in your factory for a few weeks, was rather unique. I felt that my scientific endeavours had been in vain with inadequate appreciation at their hands, and wanted naturally time to think over this extraordinary suggestion.

When I raised the issue of some financial return at the meeting for this process, it was remarked that I would have to look for it in other parts of the world! To my mind, no proposal therefore involving financial benefit for me would seem acceptable to them. The requirement as indicated in the present letter to what extent, with proposals, if any, I am "prepared to share with the Sugar Company any benefits that may arise as a result of the experiments" is not clear to me. I shall be grateful to you to kindly indicate to me what exactly is wanted of me, so that I may be enabled to specify my requirements on that basis at an early date.

Thanking you for kind advice,

Yours very truly,

Copy to Secretary, T. R. B., with compliments
Dr. L. B. S.

Indian Institute of Science,
M A L L E S W A R A M, P.O.,
B a n g a l o r e C i t y.

16th June 1941.

Rajamantrapravina
Dewan Bahadur K. Mattah, Esq., B.A.,
Chairman and Managing Director,
Mysore Sugar Co., Ltd.,
Bangalore City.

My dear Sir,

Recovery of potash from molasses.

I have for acknowledgement your office letter No.10174 of the 11th instant.

I have gone through the letter of the 5th inst. very carefully with special reference to know what is conveyed by the expression 'to share any benefits that may arise out as a result of these experiments.' It is not even now clear to me what form the benefits would take nor how much of these benefits the Sugar Co., is willing to allot to me. The proposed trials are still to be carried out primarily to ascertain the value of the process on a large scale, beneficial or otherwise. I shall therefore be grateful to you to kindly fix a date and time most suitable to you in the course of this week if possible, to enable me to talk this over with you for a few minutes, in person.

Thanking you and with kindest regards,

Yours sincerely,

Cfr to Secy, T. R. B., with compliments,

R. V. Kanarubie

23.6.41

Copy of the letter received from the Secretary, Mysore Sugar Co., dated 5th June 1941.

" I have for acknowledgment receipt of your letter of the 4th inst. addressed to our Chairman.

" At the meeting of the Board no decision was ~~xxxxxx~~ come to. The proposal to give a trial to the process was considered and the Board wished to know to what extent you were prepared to share with the Sugar Compnay any benefits that may arise as a result of the experiments. You wished to have time to think over the matter and this was agreed to. We now await your proposals, if any."

My letter of the 9th inst. is separately enclosed.

Copy of the letter dated the 11th inst. from the Secretary, Mysore Sugar Compnay.

" I am desirous to acknowledge your letter of the 9th inst., addressed to our Chairman.

" With reference to your enquiry as to what exactly is wanted of you, I have to state that this has been clearly indicated in my letter to you of the 5th inst. / The discussions at the meeting of the Board of Directors in your presence were not any decisions or suggestions. The Board will finally consider the matter on receipt of your reply."

TEL. ADD. :
" MYSUGAR "

FACTORY :
MANDYA (MYSORE STATE)

THE MYSORE SUGAR COMPANY, LTD.

"CODES USED"
A.B.C. 8TH EDN. & BENTLEY'S

TELEPHONE NO. 2133
"SANTHI BHAVAN"
SESHADRI ROAD

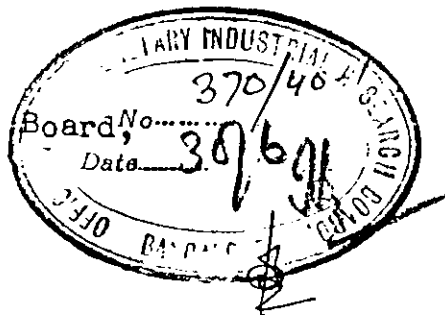
YOUR REF. NO.

BANGALORE, 27th June 1941.

OUR REF. NO. E-19/

1062

The Secretary,
Industrial Research Board,
Mysore Road,
BANGALORE.



Dear Sir,

Manufacture of Potassium Salts from
Molasses.

With reference to your letter
No.726/40-41 dated the 24th June 1941,
we write to inform you that no reply
has so far been received from Dr. A.V.
Varadaraja Iyengar on the above subject.

Yours faithfully,
THE MYSORE SUGAR CO. LTD.

W. M. Palliyar
SECRETARY.

TRR.

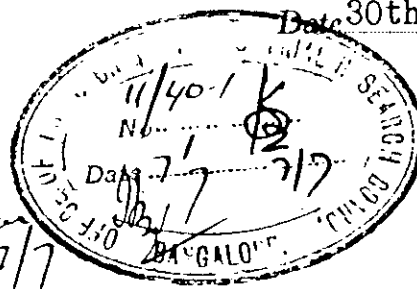
A. V. VARADARAJA IYENGAR, B.A., D.Sc., A.I.C.
BIOCHEMIST

Indian Institute of Science,
M A L L E S W A R A M, P.O.,
B a n g a l o r e C i t y.

Ref:

Date 30th June 1941.

K. Parthasarathi, Esq., B.A.,
Secretary, Industries Research Board,
Mysore Road, Bangalore City.



Acknowledged
Jh 8/7.

Dear Mr. Parthasarathi,

Recovery of Potash salts from Molasses.

In continuation of my letter of the 23rd inst. I write to state that I have finally communicated ~~the~~ to the Chairman of the Sugar Co., my proposals, in case they wish to adopt this process in their factory. I am enclosing a copy of this letter for your reference. I understand that the Board of the Mysore Sugar Co., would be meeting late in the end of August when only it may be possible to know the finality of all these endeavours. I hope the Government will not find me making any excessive demands from the Sugar company in respect of this process. If to that extent, the Government enable me to operate this unique process, which has not been known at least for the last fifty or sixty years so far as published information goes in any part of the world, I should be grateful to them for appreciating a valuable piece of work. They will also have the credit of having pioneered such an industry.

I feel that the Sugar Co., have delayed the consideration rather too long to give us the impression that they may not after all be keen about it. You are perhaps aware that Sir M.O. Forster as early as April 1940, wrote to the Chairman, Sugar company as follows. "Without figures to show the ~~cost~~ cost of application and the value of the potash recovered, I cannot say whether the process is profitable, but unless it shows a loss or unless it damages the molasses for later fermentation, I do think that it should be applied at the present time on the general principle of ~~of~~ avoiding waste or rendering this country self-supporting industrially wherever possible. It is for this reason that I venture to request your giving further consideration to the matter and if this is favourable, the necessary instructions for the process to be tested in the factory on a scale sufficiently large to decide the above two points." ~~There~~ There was sufficient indication to the company to take up the proposition further, with the expenditure of a few thousand rupees more. If the results were satisfactory, they should have put up a bigger plant and operated the same by now getting what one may call "high profits." I do not know if the company is still keen on it. Unless the Government feel anxious about it, it does not seem to me possible to make much headway in this matter, because delays are dangerous.

Even according to the estimate of the sugar factory, there is a net profit of 100 Rs. per day for treating the molasses intended for the distillery and in a year of 300 days, the ~~net~~ net return would be at least 30000 with a total turnover of over a lakh and quarter. The additional investment is comparatively small to them. As you know, they had even sold some of the filter presses which would have been of use to them in this. While the

Chairman of the Sugar company pointed to me that I had no experience of business methods, I do not feel that they ~~have~~ utilised their experience to better advantage in this case. As businessmen they should have been able to say whether this process was ~~their~~ worth their while or not. You might perhaps remember that the Chairman of the sugar company had all the ~~the relevant~~ information on this subject as early as July 1939. We are still in the preliminary stage as we were some months back. I hope the Government~~x~~ at least would appreciate the importance of this industry, as we have no supplies of potash in the country. Further, we should be helping sugar cane grower by supply of this fertiliser as also the coffe grower, reimbursing the soils with ~~what~~ what was taken from it and supply potash salts to industries like the Bichromates etc.

I hope I have ^{not} tired your patience by ~~now~~, but it would be wrong of me not to be able to say what ~~XXX~~ I feel about this undue delay. I hope you will pardon me this lapse. I refrain therefore from writing about this any further.

Thanking you and with kindest regards,

Encls.

Yours sincerely,

N. K. K. K. K.

30th June 1941.

Rajamantrapravina
Dewan Bahadur K. Matthea, Esq., B.A.,
Chairman and Managing Director,
Mysore Sugar Co., Ltd.,
Bangalore City.

My dear Sir,

Recovery of Potash salts from Molasses by my process.

I regret the delay in communicating with you after the meeting on 24th inst. when you were kind enough to discuss your Board's views with me in respect of sharing any benefits that may arise as a result of the experiments. I thank you also for the kind clarification.

I understood from you that your Board wanted certain preferences to be indicated to them prior to their taking up the large scale trials in the factory primarily to convince themselves about the utility of the ~~above~~ process. This trial was then indicated to be on a cooperative basis between the Sugar Co., and myself, the former willing to find the funds for the experiments and I myself to technically operate the process ^{free} for them. When the results are found to be encouraging, the Sugar Co., should be privileged to operate the factory scale production of potash salts by this process. I should be free to look to other parts of the world for any benefit. I am unable to accept this suggestion as there is no benefit for me in this proposition.

As an alternative it was pointed out that the preference to the Company might take the form of a ^{of less percentage} smaller Royalty than what I might el elsewhere. This view is acceptable to me provided it does not interfere my transactions in other places ^{and} or with other companies who may be involved in this process. You will no doubt realise that the Sugar Co., ge

additional ~~benefit~~ and exclusive advantage of an earlier start over others in respect of this manufacture. I certainly do not claim as much experience in 'business methods' as your goodself could, but I am afraid no one could reasonably ask me to link up my future dealings with others with ^{any previous} ~~the~~ ^(agreement to be) ready entered into with ~~you~~ the Mysore Sugar Co. I am however willing to observe this condition that I will accept a smaller royalty per ton of molasses from your company than from any other. ~~XXXXXXXXXXXXXXXXXXXXXXXXXXXX~~

I have no doubt in my mind about the feasibility of this process even on a factory scale. The Government wanted to convince themselves of the utility of this process and to that end wanted me to put up a pilot plant to treat 10 tons of molasses, for which they were agreeable to find the funds including my remuneration. If you also desire that I might carry out the trials, it is reasonable for me to expect to be paid for the same.

I give below for your kind consideration, the terms acceptable to me and sufficiently advantageous to your company. I might add that these figures were arrived at after careful deliberations.

1. I am willing to assign my patent to the Mysore Sugar Co., as desired for operation within the State, in return for a payment of 2500/- Rs. This will include a temporary license for a period not exceeding four months for purposes of trials free of any additional charges.

2. I am agreeable to operate any trial that the Sugar Co., may wish to make for which I desire to be paid the honorarium ~~referred to above~~ of Rs. 1000/- as suggested by the Government. If however you wish to get the trials carried out by your own staff, I have personally no objection to this procedure.

3. When the Sugar Co., adopts this process, after the trials, in their factory on a continued factory scale, a permanent license for the purpose

will be executed in consideration of a royalty of five annas per ton of molasses treated per day according to this process.

4. The payment of royalty due to me shall be based on audited and certified statements of accounts relative to this manufacture and be made once in six months.

5. If the Sugar Co., would prefer to compound the payment of royalty to me, I am agreeable to accept the present value of the same reckoned for a period of 12 years.

6. Should the Sugar Company consider buying up my patent for the whole of India, I am willing to consider terms, if they are suitable.

If your Board should suggest any modification on the above proposal I hope I shall have an opportunity of considering the same.

In response to ^{the recent} communications from the Secretary, I.R.B., regarding the progress ~~made~~ made in this matter, I am forwarding a copy of this letter to him for his Board's information.

Thanking you for your kindnesses and with kindest regards,

I remain,
Yours-sincerely,

*Cdr to Mr. Parthasarathi, Secretary, I.R.B. Bangalore
with compliments for the information of your Board if
necessary for the consideration of the Government.
A. C. Srinivasan
30.6.48*

(Board of Industrial Planning and Coordination.)

11th July

1

28741-2

Immediate.

The Secretary,
Mysore Sugar Company Ltd.,
Bangalore City.

Dear

Subject: Manufacture of Potassium Salts from
molasses.

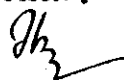
With reference to your letter No.E.19/10622 dated 27th June 1941 on the above subject, I write to inform you that Dr.Varadarajalingar has forwarded a copy of letter addressed to your Chairman regarding his final proposals in the matter for the information of the Board.

Now that his final reply is in your hands and as this important proposition - considered as a "War Potential" - is pending since a long time, I am desired to request you to be so good as to intimate the views of the Board immediately.

Yours faithfully,



SECRETARY.



HSR)

TEL. ADD. :
"MYS R"

FACTORY :
MANDYA (MYSORE STATE)

THE MYSORE SUGAR COMPANY, LTD.

CODES USED :
A.B. 5TH EDN. & BENTLEY'S

TELEPHONE NO. 2133
"SANTHI BHAVAN"
SESHADRI ROAD

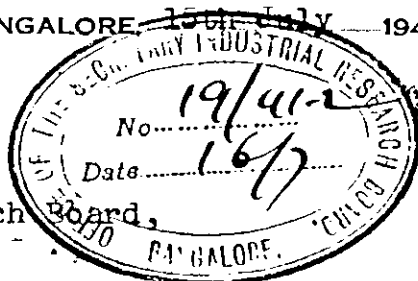
YOUR REF. NO.

OUR REF. NO. E-19/

BANGALORE, 15th July 1941.

453

The Secretary,
Industrial Research Board,
Mysore Road,
BANGALORE.



Dear Sir,

Manufacture of Potassium Salts from
Molasses.

We thank you for your letter

No.28/41-2 dated the 11th July 1941.

The above subject will be placed
before the Board meeting which will come
off during the next month. We shall
communicate their decision in the matter

in due course.

File relating to the subject Yours faithfully,
has been sent to THE MYSORE SUGAR CO. LTD.
the chairman thro'
the V.C. yesterday.

(Sd/-)
SECRETARY.

Again there appears to be
no further delay since the meeting will take
place some time next month.

orders of chairman will be awaited
16/7/41

(Board of Industrial Planning and Coordination)

79/41-2

19th August 1

The Secretary,
Mysore Sugar Company, Ltd.,
Bangalore.

Manufacture of Potassium Salts from
molasses.

I am directed to invite a kind reference to your letter No.E.19/453 dated 15th July 1941 on the subject. I have not heard from you so far in this matter. Since this question is pending from a long time, I am to request you to be so good as to have this subject placed before the Board immediately and to communicate their decision in the matter.

A line in reply is requested.

I have the honor to be,
Sir,
Your most obedient servant,

[Signature]

Secretary

Industrial Research Board,
BANGALORE.

O.N.
The file is with the
Vice Chairman.
Perhaps the Secy.
may kindly bring up the
V.C. in this connection

[Signature] 19.8.

TEL. ADD. 1
"MYSL JR"

FACTORY 1
MANDYA (MYSORE STATE)

THE MYSORE SUGAR COMPANY, LTD.

CODES USED:
A.B.C. 5TH EDN. & BENTLEY'S

TELEPHONE No. 2133
"SANTHI BHAVAN"
SESHADRI ROAD

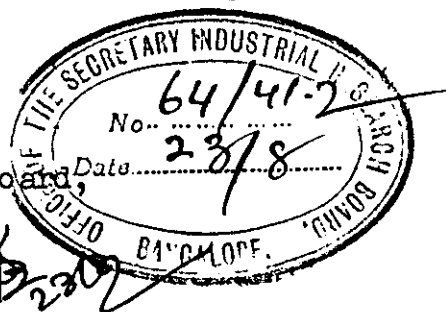
YOUR REF. No.

BANGALORE 21st August 1941,

OUR REF. No. E-19/

1593

The Secretary,
Industrial Research Board,
BANGALORE. *Pragathi Road*



Dear Sir,

Manufacture of Potassium Salts from
Molasses.

We thank you for your letter
No.79/41-2 dated the 19th August 1941.

The above subject will be
placed before the Board for its consideration
on the 27th instant and its decision
communicated to you in due course.

Yours faithfully,
THE MYSORE SUGAR CO. LTD.

M. N. Pallegar
SECRETARY

FRR.

(Board of Industrial Planning and Coordination)

8th September 1

1687

Dr.A.V. Yaradarajalingar, B.A., D.Sc.,
Bio-Chemist, Indian Institute of
Science, Bangalore.

Dear

Sub: Manufacture of potassium salts from molasses.

With reference to correspondence ending with your letter No. nil dated 30th June 1941 and as per decision arrived at the Board meeting on the 5th instant, when you were also present, I am desirous to request you to kindly interview the Chairman of the Mysore Sugar Co., Ltd again and explain how you can make your proposition more acceptable to the Company and intimate the result of your interview with the Chairman.

Yours faithfully,


Secretary.



TEL. ADD.:
"MYSUGAR"

MANDYA (MYSORE STATE)

THE MYSORE SUGAR COMPANY, LTD.

CODES USED:
A.B.C. 5TH EDN. & BENTLEY'S

TELEPHONE NO. 2133
"SANTHI BHAVAN"
SESHADRI ROAD

YOUR REF. No.

2081

BANGALORE, 6th Sept. 1941

OUR REF. No. E-19/

The Secretary,
Industrial Research Board,
BANGALORE (Mysore Road)

Dear Sir, -

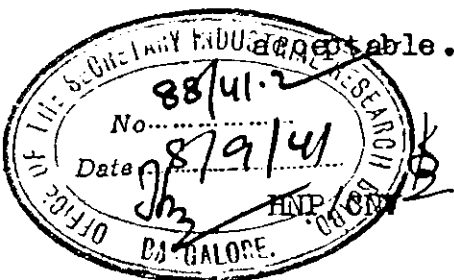
Re: Proposals of Dr. A.V. Varadaraja Iyengar for manufacture of Potassium salts from Molasses.

Kindly refer to our letter No.

E-19/1593 dated 21st Aug. 1941 in regard to the above subject. I am desirous to inform you that the further proposals received from Dr. Varadaraja Iyengar were placed before the Board of Directors at their meeting held on 30th ultimo and they have RESOLVED that these proposals are not acceptable.

Yours faithfully,
THE MYSORE SUGAR CO. LTD:

(G. R. Pallegar)
SECRETARY



Dear Sir

In the reply to your letter — I —

I am directed to ~~inform~~ ^{inform} you that Dr. A.V.V. has been requested to modify his ~~present~~ proposals and interview the chairman with a view to ^{you} make the proposition ~~more~~ ^{acceptable} attractive to the Sugar Co. to take up the investigation

Yours

(Board of Industrial Planning and Coordination)

8th Septr.

1

169/41-2

The Secretary,
Mysore Sugar Company, Ltd.,
Bangalore.

Dear

Subject: manufacture of potassium salts from
molasses.

With reference to your letter No.E.19/2081 dated 6th September 1941, on the subject, I am directed to inform you that Dr.Varadarajalingar has been requested to modify his proposals and interview your Chairman with a view to make the proposition acceptable to the Sugar Company to take up the investigation.

Yours faithfully,


Secretary.



A. V. VARADARAJA IYENGAR, B.A., D.Sc., A.I.C.
BIOCHEMIST

Indian Institute of Science,
MALLLESWARA M, P.O.,
Bangalore City.

Ref:

Date 26th Sep. 1941

K. Parthasarathi, Esq., B.A.,
Secretary, I.R.B.,
Bangalore City.

Dear Mr. Parthasarathi,

Sub.: Manufacture of potassium salts from molasses.

In accordance with the resolution of the Industries Research Board communicated to me in your letter ~~fixing~~ No. 169/41-42 dated the 8th inst. I had met the Chairman of the Sugar Co., on the 18th inst.

In the course of the interview, the Chairman suggested that any modified proposals that I may make, will be considered by his Board. Personally he felt unable to help me in my efforts, as my previous proposals were entirely unacceptable to his Board. In his view however, the earlier suggestion that the Sugar Co., should have the exclusive benefit of operating a process, in case they ~~find~~ found the process was feasible for large scale adoption in their factory, in return for their agreeing to give this process a fair trial at their expense.

As I have had the benefit of advice in respect of modifying my previous proposals, I shall adapt these into an agreeable and reasonably acceptable proposition and shall forward the same for the consideration of the Sugar Company and a copy of ~~the same~~ to you, in the next few days.

Thanking you,

Yours sincerely,

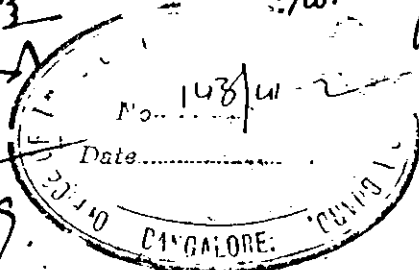
A. V. Varadaraja Iyengar

Sh
28.9.41. *Sumit*
If after this letter
will be placed before
The Board on 6.10.41

Acknowledged

Sh

30/9



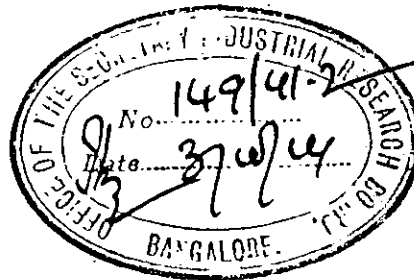
NOT necessary at this meeting

1/10

Ref:

Date 2nd Oct. 1941.

K. Parthasarathi, Esq., B.A.,
Secretary, I.R.B.,
Bangalore City.



Dear Mr. Parthasarathi,

In continuation of my letter dated the 26th Sep. last, I write to state that I have recently forwarded proposals to the Mysore Sugar Co., in respect of the process for the recovery of potash salts from molasses for consideration of the Chairman, the proposals having been modified in the light of the suggestions made at the meeting of the Industries Research Board held on the 5th Sep. 1941. I am enclosing a copy of the same for reference. I hope I have sufficiently accommodated myself with a view to making the proposition acceptable to all.

It has been recently suggested that should there be no tangible evidence on the part of the Sugar Co., to undertake the large scale production after even convincing themselves of the feasibility of this process as it perhaps will be the case, because I understood in the early stage of the discussion with the Chairman of the Sugar Co., that they would expect some other subsidiary company to undertake the entire operation including the production of tartaric acid or tamarind extracts for which he felt would be outside the scope of his Company, the suggestion being that a limited concern be started in which the Mysore Sugar Co., the Mysore Chemicals and Fertilisers Ltd., and the Mysore Government should subscribe at least 10% of the total shares, while I should be given at least 12% of shares without any monetary payment at my end in recognition of taking the process, the rest being thrown open to public subscription. If this idea is acceptable to the Government even now, we may sit at it and draw the necessary formulations to avoid delay. In that case, the entire proposition including the recovery of potash salts, preparation of tartaric acid and even starch could be undertaken. In a former letter of mine dated the 28 May 1941, I made a similar suggestion but the present one is a more elaborate one. The Directorate on the new Company will be thoroughly representative. I shall do my best. The advantages of this proposition are manifold. I hope it will be acceptable to the Government.

Thanking you again,

I remain,
Yours sincerely,

A. V. Varadaraja Iyengar

Encl.: 1.

Proposals made to the Mysore Sugar Co., Ltd., re: production of potassium sal-ts from molasses according to my patented process.

1. The Mysore Sugar Co., will be authorised, without obligation to me, to operate the above process for a period not exceeding four months, on a pilot plant scale to convince themselves of its feasibility.
2. Should the Mysore Sugar Co., require me to operate the pilot plant trial, I may be paid a reasonable honorarium, which has been tentatively ~~fixed~~ ^{estimated} by the Indian Institute of Science and the Industries Board at 1000 Rs.
3. If however, the Mysore Sugar Co., desires me to supervise the operations only, I will have to be ~~not~~ paid a travelling allowance at the rate of 1st second class fare and a ~~daily travelling allowance~~ an allowance of Rs. 10/ per day (to and from Bangalore).
4. When the Mysore Sugar ^{Co.} is reasonably satisfied with the practicability of the process, they shall proceed to adopt it for large scale production in their factory, ^{and} the necessary license will be executed by me in their favour.
5. Till such time as the Mysore Sugar Co., takes for arranging the large scale production, a reasonable allowance of ab-out 250 Rs. per month may be made to me.
6. From the commencement of the large scale production, a Royalty fixed at 5 annas per ton of molasses treated may be paid to me. Alternately, 1/5th (one-fifth) of the profits will be acceptable to me as a share in the benefits accruing to the Company.

In either case, a provisional payment every quarter based on the cost sheets maintained by the Company and finally adjusted at the end of the year, may will be helpful to me.

M. Lawrence Brierley

I. R. B. 6]

SUBJECT.....

Manufacture of Potassium Sals-

Scheme of Dr. A. V. Gupta

No. L.P. 182/42-3

To

The Secy.

Messrs. Gupta Co. Ltd.

Bangalore

Date of issue ..

3.10.42

Signed by ..

Mr T.S.

SIR,

In visiting previous
Correspondence on the subject,
I am directed to enquire
how the matter now
stands at present.

J. K.

2/10/42
Secy.

2/10/42

TEL ADD.
" MYSUGAR "

FACTORY :-
MANDYA (MYSORE STATE)

THE MYSORE SUGAR COMPANY LTD.

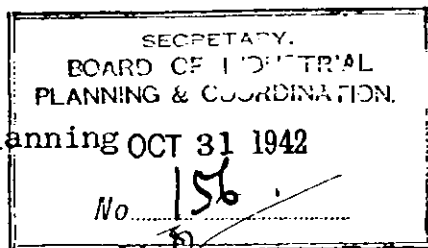
CODES USED :
5TH EDN. & BENTLEY'S.

Telephone No. 2133
Jayachamaraja Wadiyar Road,

OUR. REF. No. E-19/3396.

BANGALORE CITY...10th...Oct....1942..

The Secretary,
Board of Industrial Planning OCT 31 1942
& Co-ordination,
BANGALORE.



Dear Sir,

Re. Manufacture of Potassium salts scheme
of Dr. Varadaraja Iyengar.

With reference to your letter No.182/42-43 dated the 3rd instant, we write to inform you that Dr. Varadaraja Iyengar has paid 3 or 4 visits to Mandya in connection with the above scheme and has furnished a list of his requirements for installing the pilot plant. We have got ready most of the equipment. The site for the plant is also fixed. The roofing, which is under progress, is expected to be completed in about a week's time, when Dr. Varadaraja Iyengar will be requested to go over to Mandya to instal the plant and start working.

Yours faithfully,
THE MYSORE SUGAR CO. LTD.

K. M. Ballegar
SECRETARY.

TRR

I.P. 353/42-3

December 1942.

The Secretary, Mysore Sugar Company Ltd.,
Bangalore.

Re: Manufacture of Potassium salts from molasses
scheme of Dr. Varadarajalingar.

==

In inviting kind reference to your letter No.E-19/3396
dated the 10th October 1942, on the above subject, I am
directed to request you to be so good as to arrange to
forward progress reports from time to time. The present
position may kindly be intimated.

Yours faithfully,

For 4/12/42
Secretary.
Ph

TEL ADD.
"MYSUGAR".

FACTORY:
MANDYA (MYSORE STATE)

THE MYSORE SUGAR COMPANY LTD.

CODES USED :
A.B.C. 5TH EDN. & BENTLEY'S

OUR. REF. NO. G-6/5480

SECRETARY
BOARD OF INDUSTRIAL
Telephone No. 2133
PLANNING - Jayachamaraja Wadiyar Road,
DEC 11 1942
BANGALORE CITY 10th Dec. 1942.
No. 218

The Secretary,
Board of Industrial Planning and
Co-ordination,
BANGALORE.

Dear Sir,

Re. Scheme of Dr. A.V. Varadaraja
Iyengar for recovery of Potassium
Salts from Molasses.

With reference to your letter
No.L.P.353/42-43 dated the 5th inst.
we write to inform you that Dr. Varada-
raja Iyengar gave a list of his require-
ments on the 15th Sept. 1942 including
a shed to be put up in the Distillery yard.
Our Works wrote to him on the 9th Octr.
1942 that the materials were ready and that
the shed would be completed a week later.
The latest communication that has been
sent to him by our Works is on the 18th
Nov. 1942, advising him that he may call
at Mandya any time to start putting up the
plant. Our Works have not heard from him
in the matter.

Yours faithfully,
THE MYSORE SUGAR CO. LTD.
K. N. Balligara
SECRETARY.

TRR.

I.P. 400/42-3

December 1942.

The Secretary, Mysore Sugar Company Ltd.,
Bangalore.

xxx

Dear Sir,

Re: Scheme of Dr. Varadarajalingar for recovery
of potassium salts from molasses.

+++

Many thanks for your letter No.G.6/5480 dated the
10th December 1942.

Dr. Varadarajalingar has been addressed in the
matter.

Yours faithfully,

To 18/12/42
Secretary.

[Handwritten signature]

I.P. 399

18th December 1942.

Urgent.

Dr.A.V. Varadarajalingar, D.Sc.,
Bio-Chemist, Indian Institute of Science,
Bangalore.

Dear Sir

Subject: Scheme re: recovery of Potassium Salts
from molasses.

++++

It is ascertained from the Mysore Sugar Company that the shed and the materials required are ready and that they had requested you to call at Mandya any time to start putting up the plant.

I am to request you to kindly forward immediately a detailed report of work done in this behalf.

Yours faithfully,

For [Signature]
Secretary.
[Signature]

24. 707 / 42 3

9th June 1943.

Immediate.

Dr. V. Varadarajalingar, J.Sc.,
Bio-Chemist, Indian Institute of Science,
c/o Industrial and Testing Laboratory,
Bangalore.

XXX

Dear Sir,

Subject: Scheme re: recovery of Potassium Salts
from molasses.

++++

I write to invite reference to this office letter No.I.P.399 dated the 18th December 1942, on the above subject and say that no reply has been received from you in spite of reminders. May I request you to kindly let me know immediately how the work now stands at present at Mandya?

An immediate reply is requested.

Yours faithfully,

12. 9. 6. 43
Secretary.

9- 12 -

DR. A. V. VARADARAJA IYENGAR,
BIO-CHEMIST.

Tel. Addn
Dr. Varadarajan,
Malleswaram.

SECRETARY.
BOARD OF INDUSTRIAL
PLANNING & COORDINATION.

Ref: JUN 14 1943

No 406

Handwritten: *Go the Mysore Sugar Co. in*
MALLESWARAM P.O.,
BANGALORE CITY.

Date 14 June 1943

The Secretary,
Board of Industrial Planning & Coordination,
General & Revenue Secretariat
Bangalore city:

Dear Sir,

Re: Recovery of molasses for molasses No. J. 8707/42-3.

I write to acknowledge with thanks your letter of the 9th inst. which reached me at Mangalore today.

I remember I had a reference in December from the Government Director, Industrial Concerns about the progress made in respect of the I believe I sent up a short note on that through him. I do not know of any other reminder. But I have kept him informed of the work.

As for the work itself, I am glad to state that the different equipment for the pilot plant trials have been completed already. A first batch of molasses has been treated with tannin. I came here in the last week of May and would continue to stay here until good progress is made. As soon as the plant is in a satisfactory condition, I shall make a further report to you in the usual manner.

Thanks you for your kind reference.

Yours faithfully,
A. V. Varadarajan

J.P. 16/03-44

5th
August 1943.

The General Manager, Mysore Sugar Company Ltd.,
Maniya.

Subject: Manufacture of potassium salts by
Dr. Varadarajalingar.

I am directed to request you to be so good as to
immediately forward a report on the work done by Dr. Varada-
rajalingar on the above subject and the progress if any
achieved so far.

I have the honor to be,
Sir,
Your most obedient servant,

sd. T. Shananna.

Secretary.

J.P. 17/03-44, 5/8/43

Copy of above is forwarded with compliments to
the Secretary, Mysore Sugar Company Ltd., Bangalore for
favour of information.

Td 5/8/43
Secretary.

9th
10th

I.P. 18/43-44

5th August 1943.

Immediate.

The Government Director, Industrial Concerns,
Bangalore.

Subject: Manufacture of cream of tartar and
tartaric acid at I.T.L.

I am directed to request you to be so good as to immediately obtain and forward a detailed report on the experiments conducted by Dr. Varadarajaiengar in the manufacture of cream of tartar and tartaric acid at the Industrial & Testing Laboratory from the commencement.

I have the honor to be,
Sir,
Your most obedient servant,
sd. T. Shamanna.

No. I.P. 49/43-44.

Secretary.

Copy of the above is forwarded to Dr A.V. Varadarajaiengar, D.Sc., c/o the General Manager, Mysore Sugar Company Ltd., Mandya with a request to kindly intimate as to whether the process now proposed to be adopted for the manufacture of potassium salts at Mandya has been changed from treatment with Sulphuric acid to treatment with tamarind juice and if so a report may sent in the matter at a very early date.

Secretary.
Ch. H.

TEL ADD.
"MYSUGAR"

FACTORY :
MANDYA (MYSORE STATE)

THE MYSORE SUGAR COMPANY LTD.

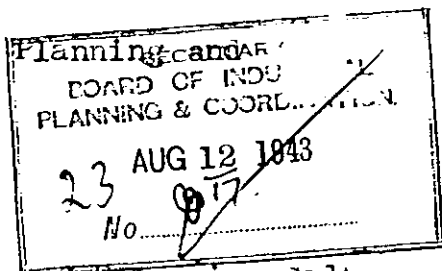
CODES USED :
A.B.C. 5TH EDN. & BENTLEY'S.

Telephone No. 2133
Jayachamaraja Wadiyar Road,

OUR. REF. NO. E-19/1250

BANGALORE CITY.....10th Aug. 1943.

The Secretary,
Board of Industrial
Co-ordination,
BANGALORE.



Dear Sir,

Re. Manufacture of Potassium Salts
by Dr. Varadarajaiengar.

We are in receipt of your memo No.I.P/17-43-44 dated the 8th instant, forwarding a copy of your letter No.I.P/16-43-44 dated the 5th August 1943 addressed to our General Manager at Mandya requesting him to forward a report on the work done by Dr. Varadarajaiengar on the above subject and the progress, if any, achieved so far. We shall be glad if all such letters are, in future, addressed to this office and not to our General Manager at Mandya.

Yours faithfully,
THE MYSORE SUGAR CO.LTD.

De Subbarajappa

SECRETARY.

TRR.

DR. A. V. VARADARAJA IYENGAR,

Address:
Dr. Varadarajan,
Malleswaram.

SECRETARY.	
BOARD OF INDUSTRIAL	
PLANNING & COORDINATION	
Ref:	AUG 28 1943
No.	30 - <i>✓</i>

Mandya

MALLESWARAM P.O.,
BANGALORE CITY.

Date 23rd August 1943.

The Secretary,
Board of Industrial Planning & Coordination,
Bangalore city

Dear Sir,

Ref: your letter T.P. 18419/43-44 dated 5th August 1943

I have not been
able to present the
report.

In reference to the list calling for a report of the work on the manufacture of cream of Tartar & Tartaric Acid at the T.T.L. from the commencement, I have been addressed by the Government Director for an early report. In view of the fact that I have been obliged to be at Mandya for a long time in connection with the trial for recovering potash salts from molasses. I have had no relief thereby way of technical assistance, I have today addressed the Government Director accordingly. I am enclosing herewith a copy of my letter to him, for your information. You will have to excuse me these manuscript letters as I cannot command typing conveniences.

Re: T.P. 19/43-44 -

The process under trial has not been changed in respect of manufacture of potassium salts. I do not know if I have not correctly explained myself in my notes. Anyway, I wish to add, that in place of pure tartaric acid necessary for combining with the potash of molasses, the crude concentrated tamarind juice is employed. In other words, for the first experiment the tamarind juice serves as the source of tartaric acid. When once the combination of the potash and tartaric acid results in the precipitation of cream of tartar, the recovery of tartaric acid from the cream of tartar is effected through lime salts, as lime tartarate, from which through treatment with Sulphuric Acid, the free tartaric acid is regenerated, for treating a fresh batch of molasses. I believe I have explained myself. I am enclosing herewith a blue print made by me to illustrate the process under trial. It will be noted that Sulphuric acid will be needed for regenerating the acid. Tartaric acid, whatever may be the nature of the potash salt, whether it is the Sulphate, or the chloride, or caustic potash, potassium carbonate. Instead of purchasing tartaric acid, the indigenous tamarind is made use to cheapen the initial cost. If I have not explained myself clearly, please let me know, so that I shall try and explain in greater detail.

Thanking you

Encls: 2.

Yours faithfully
N. Govindarajan

Dear Mr. Ganapathi Iyer,

I have been addressed by the General Manager, I.T.L. re the report asked for by the Secretary, Board of Industrial Planning & Coordination, re Cream Plantation and also re setting of the area at the I.T.L.

You are well aware of the fact that I have been here since I came at Manjeri for the last 3 years. I have been here except for a few days stay at Bangalore. I have been compelled to stay here for want of adequate assistance, with the result that the entire charge of the operation has been upon me. There are 10 to 12 shifts every day. I am well, therefore, a little tired and find it difficult to prepare the report at Manjeri. Unless I have relief and am enabled to go to Bangalore, I do not think I can do anything in the matter. I have not got any details with me relating to the work done at the I.T.L.

Since you have requested me to sever my connection with the work at the I.T.L., I do not think if my assistance is needed in respect of the accounts, at this stage. Whatever is due to me by way of remuneration at the rate I should be asked for, may be paid to me, due deduction for tax and other deductions.

Thanking you for early attention and kind regards.

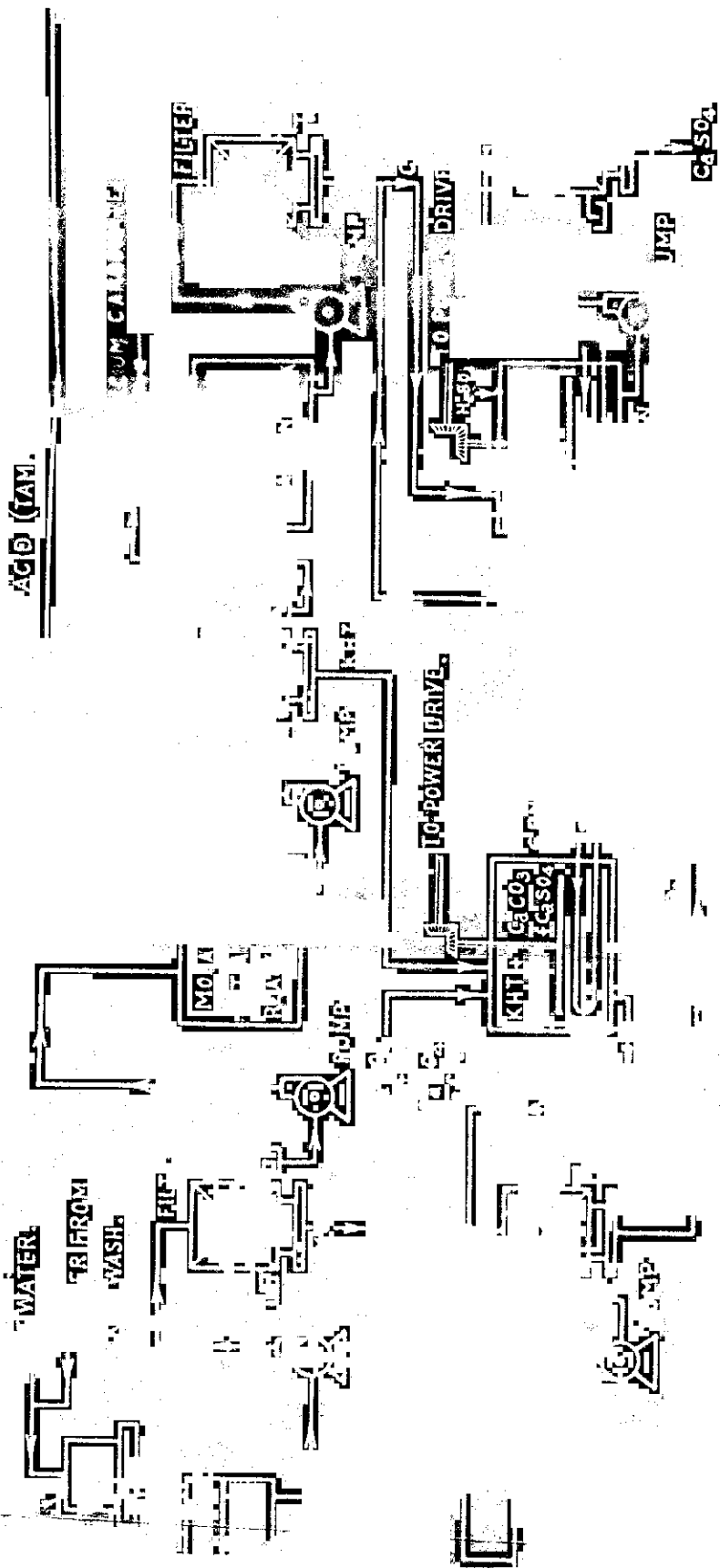
Yours truly,
E.V. Ganapathi Iyer

E.V. Ganapathi Iyer Esq. B.Sc.
Govt. District Industrial Officer
limited Indian Bank Bldg.
Bangalore City.

CH TANKS

WATER

TR FROM
WASH



RECOVERY OF PC JM TS

IN THE
RECOVERY

DR. V. VARADARAJA IYENGAR,
BIO-CHEM.

Tel. Address :
Dr. Varadarajan,
Malleswaram.

Ref:

SECRETARY. BOARD OF INDUSTRIAL PLANNING & COORDINATION.	
SEP 6 1948	
31 No.	<i>[Signature]</i>

MALLESWARAM P.O.,
BANGALORE CITY.

Date September 5, 1948.

The Secretary,
Board of Industrial Planning and Coordination,
Bangalore.

Dear Sir,

In continuation of my letter of the 23rd August last, I am enclosing herewith a copy of my report sent to the General Manager, Mysore Sugar Co., Mandya for being forwarded to you. In view of the fact that we were not able to secure green tamarinds in Mandya, we tried to arrange with the I.T.L. to process a few tons of the same. Unfortunately, this arrangement did not help to realise the required quantity of lime tartrate even. In the meantime, the work had to be pushed through. Therefore we had to have recourse to the ripe tamarind fruits, to save time. In this case, an evaporator is an essential equipment, in the absence of which the present trials have taken some extra time. Immediately, tartaric acid extract is secured, the trials will start and samples of potassium sulphate realised will be sent to you.

I am preparing the report in connection with the manufacture of Cream of tartar and tartaric acid at the Government I.T.L. during the last 2 seasons. As I understood from the Government Director, that the possibility of this work being continued is remote, I do not know if the report will be valuable at all. As it has been my motto always not to fail at my end, I shall get this prepared. But if you should feel that it is needed, I shall be glad to be advised. Even for the last seasons work, I have tried my utmost in every respect and I expect to get my returns for the same--I know not when. I must point out that I had repeatedly urged the Govt. Director and written that my remuneration will have to be increased. *even last year* he has chosen to fix it at the rate he has recommended. I had raised this matter again with him. In the meantime, I did not want to discontinue my association. In fact I have put *as much* zeal as I could possibly do.

Thanking you,

Yours faithfully,

[Signature]

End: copy of a report:

Report on the experiments relating to the recovery of Potash ~~xxx~~
salts from molasses.

The experiments relating to the pilot plant trial commenced towards the last week of week of May 1943. Although the equipment was not complete in all respects, certain preliminary trials had to be made essential for the first stage of the process under examination. This process for the sake of convenience be divided into two major sections, viz., the separation of potash in molasses as Cream of Tartar through the addition of tartaric acid extracts or solutions and the recovery of potash from cream of tartar ~~xxx~~ as well as of tartaric acid in a suitable manner, the latter to be used over again to treat fresh batches of molasses.

It will be obvious that for successfully accomplishing the first stage, both molasses and tartaric acid will have to be secured to the desired consistency, concentration and purity. The report under consideration includes the experimental investigations relating to these two items, viz., Securing a good clarification of molasses and preparation of a concentrated extract or solution of tartaric acid from tamarind fruits. Molasses as it is collected and stored, cannot be employed as such for the trials without being clarified, inasmuch as it contains a good percentage of suspended impurities. It may be said to consist essentially of calcium salts which will seriously affect the course of the reaction intended to be brought about. The quantity of this impurity may be roughly reckoned at 1% on an average on molasses which contains generally 3-4% Potash. In addition to this, molasses is also found to contain sulphurous acid arising from the sulphitation of cane juice. The removal of this acid, which may be as high as even 0.6% in certain cases, is necessary for this process. Clarification of Molasses therefore aims at the elimination of these two interfering factors.

EXPERIMENT NO. I. Clarification of Molasses. The removal of insoluble calcium salts is generally effected through diluting molasses and through settling down of the insoluble material. For reasons ~~xx~~ which will be gone into at a later stage, this dilution cannot be large also. In addition, certain physical treatments help the settling down of these impurities.

(a) Dilution with equal volume of water. 1 vol. of molasses (90 gals) was mixed with 1 vol. of water (90 gals) in a cylindrical vessel with a conical bottom for about $1\frac{1}{2}$ hours and allowed to settle. Samples were taken in jars at periodic intervals of half an hour to determine the minimum period necessary for the complete sedimentation of impurities without fermentation setting in. Similar tests in the laboratory showed that an interval of 5 hours was needed. In these large scale trials, it was found that even after 8 hours, the sedimentation was incomplete.

The above experiment was repeated, the diluted molasses being heated for a short time till it reached a temperature of 70, 80, 90 degrees and a momentary boiling. It was found that initially that the boiling of molasses after dilution even though for an instant enabled the complete sedimentation of the calcium salts. Subsequently it was found that maintaining the diluted molasses even at a temperature of 80--85° for about 15 mins. resulted in a rapid settling down of the undesirable components. Generally a time interval of about 6 hours was necessary, when the diluted molasses was heated. The specific gravity of molasses at this dilution is generally about 1260.

(b) Dilution with half the volume of water. 90 gallons of molasses were diluted with 45 gallons of water to keep the concentration of potash at high level, the solution being heated to 80° after dilution.

The specific gravity of the solution was 1260.

but in this case the time taken for the precipitate to settle down in the dilution tank was as much as 26 hours. Although this is rather a long interval, this could be reduced to under 20 hours by certain manipulative details.

(c) In another trial, 3 parts of molasses were mixed with 2 pts. of water and heated to boiling for a moment. The Specific gravity of the solution after cooling was found to be about 1280 and the time taken for sedimentation to be complete was nearly more than half a day--the maximum time being about 16 hours.

The total volumes secured in each case will be slightly less than the sum total of the two ingredients mixed.

EXPERIMENT NO. II. Removal of Sulphur dioxide in the molasses was effected through addition of calcium carbonate reckoned roughly at the rate of 1 lb. per cwt. of molasses. In addition to removing the sulphurous acid, certain other organic acids also are removed by this method. Other methods of removing sulphur dioxide were not tried.

EXPERIMENT NO. III. Preparation of Extracts or Solutions of Tartaric acid from tamarind fruits for treating diluted molasses. It had been shown by me earlier that the best raw material for this experiment was featured in the raw tamarind fruits. Unfortunately it could not be secured in Madhya during the last season at reasonable rates. Since about 7 tons of green mature tamarind fruits were needed, arrangements were made with the kind consent of the Government Director to treat about 10 tons of raw tamarind at the Govt. I.T.L. for these trials. It was however impossible to treat any quantity. In order to avoid delay--which will mean 1 year--the utilisation of the ripe fruits was thought of and the report deals with the experiments conducted in that respect. It must be stressed at this stage that the object was not one of getting an acid extract somehow but to secure an extract rich in respect of tartaric acid for treatment directly with molasses, evaporation of dilute solutions being out of consideration for want of adequate evaporating equipment.

(a). Leaching of tamarind fruits with water. Ripe tamarind fruit contains free tartaric acid to the extent of 5 per cent or thereabout the quantity varying rather widely. 6 cwts. of the ripe tamarind fruits were initially employed for the purpose. The experiment was designed as follows: A quantity of fruit approximating to 1 cwt. was treated with 100 gals. of water and mashed for some hours so that the acid may get dissolved. If the mash is allowed to percolate, it will be advantageous, because the liquor will then be clear. As percolation is impossible because of the high gummy matter present therein, it was considered necessary to squeeze out the juice as much as possible. Such juice was very small in quantity, neither was it clear. The difficulty with the raw material is that the pulp absorbs several times its weight of water and swells and does not release the liquid under pressure ordinarily to be obtained in squeezing. Therefore the pulp was diluted with water roughly in the proportion of 150 gals. to 50 lbs. of material and the mash allowed to settle. A certain amount of clear liquid was secured. The acid content of this extract was found to be 0.35%. This liquid which could be realised to the extent of 30 gals. was not adequate. Therefore the residual pulp was centrifuged off in the hope of securing further quantities of the juice. The essential defect in these experiments is the centrifuge which was already available in the factory but which was found on use not to conform to a standard pattern. Greatest trouble had been experienced with it, although it was needed at every stage for separating solids from liquids.

The combined extracts obtained above were mixed with a fresh batch of the pulp which had already been softened with water and the procedure outlined above, repeated until about 5 cwts. were treated. I had secured thus 170 gallons of an extract containing approximately 0.75% free tartaric acid. In other words, I had extracted only 11 lbs. of the tartaric acid. This was added immediately to 5 cwts. of diluted molasses (with equal volume of water). There was

a small quantity of precipitate mixed with some quantity of fibrous material amounting to 5 lbs. After separation, the liquor was neutralised with calcium carbonate to recover tartaric acid contained therein. The dilution is so large that cream of tartar formed, was not precipitated completely being somewhat soluble.

as

XXXXXXXXXX

(b). Recovering tartaric acid ~~from~~ lime tartrate. Since the above trials did not facilitate the recovery of tartaric acid from the pulp in a concentrated form, alternate methods of recovering tartaric acid had to be adopted. With this end in view the residual tamarinds from the 6 cwts. of the treated pulp was treated with calcium carbonate prepared from lime used in the factory. For this purpose, lime was exposed on steel plates to the carbon dioxide from fermentation tanks. 150 parts of tartaric acid require 100 parts of pure carbonate to form 260 parts of lime tartrate. The neutralisation is controlled by the nonproduction of carbon dioxide. This was checked against litmus paper which had to be prepared in the laboratory, by me for this purpose. It was subsequently found that the carbonate prepared as above was highly contaminated with lime and had to be controlled adequately. The neutralised material was centrifuged and the solid residue collected and dried. Unusually the residue was dark coloured in the earlier stages of the work. Subsequently through proper control a satisfactory product was obtained from about 1 ton of the tamarind pulp. The dried material so obtained was about 600 lbs. including the insoluble dry pulp of the fruit and also lime tartrate.

(c) recovery of acid extract from lime-tartrate-containing dry pulp. The dried pulp was treated in batches of 100 lbs. each with Sulphuric acid in leadlined tanks provided with lead coils. Each batch sample produced carbon dioxide on the addition of acid. The time of treatment was 2 hours maintained at not more than 80°. The factors governing this conversion may be grouped as follow: 1) The degree of fineness of the precipitate; 2) the temperature of the reaction; 3) the time for which the temperature is kept; 4) the rate of stirring and 5) the excess of sulphuric acid. The first one could not be controlled at all. The other factors were closely adhered to from batch to batch. The total quantity of sulphuric acid added amounted to 205 lbs. of 35°Bé - corresponding to about 80 lbs. of pure acid. Assuming that this would convert about 180 lbs. of lime tartrate contained in the dry pulp (roughly estimated), the quantity of tartaric acid solution was added to small batches of molasses 2 cwts. at a time. Even here, probably on account of the dilution, the precipitation of potash was not evident. Hence the acid precipitated as lime tartrate through added calcium tartrate. The precipitate so obtained amounted to 393 lbs. The precipitate was tested later because of certain discrepancies and found to react alkaline. This was treated with about 80 lbs. of pure sulphuric acid in batches at a dilution of 50%. It was found that the liquor after the usual methods of testing was fairly weak, showing that the added sulphuric acid had neutralised the carbonate only and not reacted with the tartrate.

d). Work in progress. In view of this defect, it has been found necessary to critically examine the dried pulp as well as the lime tartrate precipitate to secure tartaric acid in a fairly pure concentrated addition. Thus far, only 1 ton of the pulp has been treated and the tartaric acid realised from this would be mixed with molasses. The experience gained by this would be taken advantage of for processing an additional 1 ton of the tamarind pulp for the regular trial.

I wish to express my gratefulness to the General Manager, Mysore Sugar Co., for his kind encouragement in the course of this work, particularly when difficulties in the course of the work.

A P P E N D I X.

D A T E	Tamarind fruit used	Quantity of the pulp	Total amount of dried mat- erial	Time of treatment in all
29-5-43	4 bags	Apr. 450	lbs	
30-5-43	2 bags	" 230	lbs	
12-6-43	2 "	" 222	lbs	
14-6-43	2 "	" 224	"	
18-6-43	2 "	" 224	"	594 lbs.
20-6-43	2 "	" 224	"	
27-6-43	2 "	" 224	"	
28-6-43	2 "	" 224	"	
29-6-43	2 "	" 224	"	
Total time ~~about~~ to complete the drying etc. was about 45 days.				

T a b l e II.

D a t e	Quantity of dried material treated	Sulphuric acid added
15-7-43	60 lbs.	
16-7-43	96 "	
16-7-43	98 "	
25-7-43	100 "	
6-8-43	90 "	
8-8-43	50 "	
In terms of concentrated acid, between 85 and 86 lbs.		

T a b l e III.
Treatment of Lime salt.

Date	Weight of lime salt (lbs)	Weight of Sulphu- ric acid (41°Bé)
18-8-43	73 $\frac{1}{2}$	59 $\frac{1}{2}$ lbs.
19-8-43	50 $\frac{1}{4}$	30 "
20-8-43	50	----
21-8-43	61 $\frac{1}{4}$	25 lbs.
22-8-43	158	65 lbs.

These precipitates were found to contain quite a high percentage of free calcium carbonate and some lime, the quantity of which was found to be on analysis as much as over 50%. On that sample, the 65 lbs. of acid added had not completely neutralised the carbonate present initially. Therefore a second treatment of the precipitates with acid has to be repeated and this work is being tested at every stage, is in progress.

Carroll, J. H. M.
5.5.43

L.P. 28/43-44

Dated 8.9.43

The Secretary, Mysore Sugar Company Ltd.,
Bangalore City.

xxx

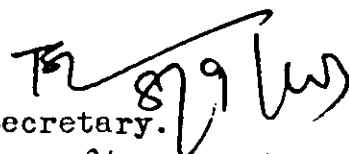
Dear Sir,

Subject: Manufacture of potassium salts by
Dr. Varadrajalegar.

==

In inviting reference to your letter No. P.19/1250
dated the 10th August 1943, on the above subject, I am
directed to request you to be so good as to expedite
your reply in the matter.

Yours faithfully,


Secretary.





I.P. 21/43-64

8th September 1943.

Urgent.

The Government Director,
Industrial Concerns, Bangalore.

Subject: Manufacture of cream of tartar and
tartaric acid at I.T.L.

++

I am directed to invite reference to this office
letter No.I.P.18/43-64 dated the 5th August 1943, on the
above subject and to request you to kindly expedite the
forwardal of a clear report on the work done by Dr.Varada-
rajaengar from the commencement at the Laboratory.

The favour of an urgent compliance is requested.

I have the honor to be,
Sir,
Your most obedient servant,

8/9
Secretary

TEL ADU.
"MYSUGAR."

FACTORY:
MANDYA (MYSORE STATE)

THE MYSORE SUGAR COMPANY LTD.

CODES USED:
A.B.C. 5TH EDN. & BENTLEY'S.

Telephone No. 2133
Jayachamaraja Wadiyar Road,

OUR. REF. No. E-19/2128

BANGALORE CITY....9th...Sept...1943.

The Secretary,
Board of Industrial Planning and
Co-ordination,
General & Revenue Secretariat,
BANGALORE.

SECRETARY, BOARD OF INDUSTRIAL PLANNING & COORDINATION. SEP 11 1943 35 No. <u>R</u>

Dear Sir,

Subject: Manufacture of potassium
salts by Dr. Varadaraja Iyengar.

With reference to your letter

No. I.P/20/43-44 dated the 8th instant,
we write to inform you that we have received
a report from Dr. Varadaraja Iyengar on the
work done by him regarding the manufacture of
potassium salts at Mandya, and we have for-
warded the same to our General Manager at
Mandya for remarks and return. We shall
revert to the subject as soon as we hear
from our General Manager.

Yours faithfully,
THE MYSORE SUGAR CO. LTD.

Subbarayappa

SECRETARY.

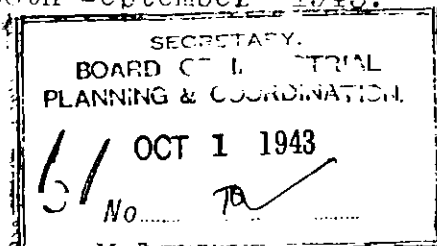
TRR.

Dr.A.V.Varadaraja Iyengar,

Indian Institute of Science,
M a l l e s w a r a m P.O.,
Bangalore City.

28th September 1943.

The Secretary, Board of
Industrial Planning and Coordination,
General and Revenue Secretariat,
Bangalore City.



Dear Sir,

Re: Recovery of Potash salts from Molasses.

In continuation of my letter of the 5th inst. forwarding a report of my work at Mandya, I write to inform you of the decision of the General Manager, Mysore Sugar Co., Mandya conveyed in a letter recently received, that the trials for recovery of potash need not be continued further. I enclosing herewith copies of ~~the~~ letters between the Mysore Sugar Co., and myself for your information,

Thanking you for your kindness,

Yours very truly,

H. K. K. K. K. K.

Encls.

Mandya Sugar Co., Ltd.,
Factory Office, Mandya.
4th Sep. 1943.

G/916.

M E M O

Messrs .B.S.Govinda Rao and M.K.Rajen, Chemists will return for work in the factory from Monday the 6th inst. The work in Potash pilot plant may be suspended and the various ingredients that are there kept in order to resume work later.

Copy to Dr.A.V.Varadaraja Iyengar.

Copy of Dr.A.V.Varadaraja Iyengar's letter dated the 21st inst. to the General Manager, Mysore Sugar Co., Mandya.

I received your Memo of the 4th inst. in which ~~xxx~~ the chemists ~~wh~~ who were asked to work with me, were required to resume work in the factory from the 6th inst. and that things be kept in order until the work is resumed. I gather that until my return to Mandya, this work ~~will~~ will be under suspension. The chemist whom you had posted towards the end of last month, was in my opinion the best of the lot, since he took great deal of interest and showed much enthusiasm. I was more happy also because it was only necessary for me to tell him of the nature of experiments and he was quick enough to undertake the same and evince much zeal. I hope someone like him will be made available to me for ~~work~~ this work.

I do not know at what stage the work had been left. All that now would remain to be done, is that the lime tartrate will have to be treated finally with sulphuric acid and the extract added to molasses, from which precipitate, the potash sulphate will be realised.

I am unable to get out of Bangalore until the end of the month as I have to attend to some religious functions at home. I expect to be there early next month. I hope the trials would be complete in a fortnight's time, if the carbonate in the residues had been neutralised in my absence, for which I had left instructions with the Chemist in-charge.

.....
xxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxx

P.T.O

DR. A. V. VARADARAJA IYENGAR,
BIO-CHEMIST.

Indian Institute of Science
MALLESWARAM P.O.,
BANGALORE CITY.

Tel. Address:
Dr. Varadarajan,
Malleswaram.

Ref:

Date 28th September 1943.

The Chairman and Managing Director,
Mysore Sugar Co., Ltd.,
Jayachamaraja Wadiyar Road,
B a n g a l o r e C i t y.

Dear Sir,

Re: Trials for recovery of Potash salts from Molasses

In continuation of my letter of the 5th inst. I write to inform you that I had written to the General Manager on the 21st inst, a copy of letter having been forwarded to the Secretary also, and received the r (copy of the letter enclosed) that the trials need not be continued. I not know the reasons for this decision.

In order to enable you to know the position as it stood when I came to Bangalore early this month, I am summarising the work in the following words, to be

The potash in molasses is reacted with tartaric acid contained in tamarind fruit, to realise the insoluble potassium-acid-tartrate. For this purpose, the molasses had to be clarified at very low dilution with a view to remove the impurities present therein. This experiment had been completed. As source of tartaric acid, in place of raw tamarinds with which I had experimented before and which you kindly saw when you visited the I.T. in January 1942, the pulp of the ripe fruit had to be processed being out of season. Apart from the difficulties inherent to this raw material, other difficulties also had to be encountered for the trials. Thus, for want of chalk required to recover the tartaric acid as lime salt, I had to prepare chalk from the lime available there. The main defect came at this point. In spite of my instructions and demonstrations and tests, this preparation had been defectly carried out by the men posted for helping me in the work. I will kindly appreciate that I have to content myself and do all that is possible with the men and facilities available at the factory, where the facilities were to be found to be limited indeed. In consequence, the lime salt of tartaric acid, had become heavily contaminated with excess chalk & lime, to remove which alone, a large part of the sulphuric acid had to be used before the lime tartrate is attacked by sulphuric acid. A small excess of chalk is a necessity. This was a surprise to me and I kept the General Manager informed of this. Each batch had to be specially treated by careful planning. I had indicated my anxiety in my letter of the 5th inst. to you.

When I left early this month, I had instructed the chemist who was posted to work with me, to complete the certain experiments designed to overcome the defects due to addition of excess lime etc., when I heard from the General Manager on the 5th inst. (vide his Memo of the 4th Sep. that the work 'may be suspended in order to resume work later.'

As it is, the actual trials for treating the molasses is still to be accomplished, when it is proposed to be discontinued. This decision is very much to be regretted. I must say that I could not do much more than what I did, considering the facilities available to me there.

With kind regards,

Yours sincerely,

Copy with Compliments to the Secretary, Board of Industrial Planning & Reconstruction, Bangalore, 28/9/43

R.T. SHAMANA, L.A.,

J.P. 191/43-ur

18th January 1941.

Dear Sir,

Subject: Manufacture of Potassium salts.

++

With reference to your Secretary's letter No.E.19 2167 dated the 10th September 1940, on the above subject, I am desirous to state that when the Minister for Industries and Supplies was in Mandya on the 5th Decr. 1943, it was decided that the Mysore Sugar Company would arrange to obtain a quantity of tartaric acid from the Industrial Testing Laboratory where it is being manufactured and that thereafter Dr. A. V. Varadarajaiah would be given this quantity within two weeks of the receipt of the acid for demonstrating the process of extraction of potash from molasses at Mandya and that Dr. Varadarajaiah should also satisfy the Company authorities that the molasses liquor after extraction of the potash will still be quite suitable for fermentation into alcohol and that further report would be sent in the matter.

I am to request you to be so good as to arrange to expeditiously pursue the matter and to initiate the present stage. The Government Director, Industrial Concerns has been requested to expedite the supply of tartaric acid, if it is not already done.

Yours sincerely,

Abdul Aziz Khan, Esq., B.A.,
Chairman, Mysore Sugar Company Ltd.,
Mandya.

sd. T. Shamana.

J.T.O.

Memo No. I.P. 199/43-44 Dated, 18th January 1944.

Copy of the foregoing is forwarded with compliments to the Government Director, Industrial Concerns, Bangalore for information and necessary immediate supply of the acid, if not already done.

By Order,

Secretary.

January 1944.

Mr. T. Shemanna, M.A.,

D.O. L.P. 287/43

7th March 1944.

Dear Sir,

Sub: Manufacture of Potassium Salts.

++

I am desired to invite reference to this office D.O. letter No. I.P. 191/43-44 dated the 10th January 1944, on the above subject and to request you to be so good as to intimate the present stage.

Yours sincerely,

Rab/3/mg

Abdul Aziz Khan, Esq., B.A.,
Chairman,
Mysore Sugar Company Ltd.,
Bangalore.

9/3

THE MYSORE SUGAR COMPANY, LTD.

OUR REF. NO. E-19/ 7571

SRI JAYACHAMARAJA WADIYAR ROAD
BOARD OF SCIENTIFIC RESEARCH
BANGALORE CITY, 14th March 1944.

MAR 14 1944

T. Shamanna, Esq., M.A., ...
Secretary,
Board of Scientific and Industrial Research,
BANGALORE.

Dear Sir,

Re. Manufacture of Potassium Salts.

With reference to your D.O. letter No.I.P.191/43-44 dated the 18th January 1944 and subsequent reminder dated the 7th March 1944 enquiring the stage in which the question of manufacture of Potassium Salts stands at present, we write to inform you that the quantity of Calcium Tartarate required by Dr. Varadaraja Iyengar has been made available to him and he has been requested to start his experiments about the 22nd of this month.

A copy of letter No.G-3868 dated the 13th March 1944 received from our General Manager at Mandya on the subject is sent enclosed for perusal in this connection.

Yours faithfully,
THE MYSORE SUGAR CO.LTD.

Subbarayappa
SECRETARY.

ENC. ONE.
TRR.

Copy of letter No.G-3868 dated 13-3-44
from the General Manager, Mysore Sugar
Co.Ltd., Mandya.

Dear Sir,

Re. Manufacture of Potassium Salts-
Ref. your letter No.E-19/7488/10-3-44

We have kept you, duly informed, about the progress in the matter, since the visit of the Minister for Industries in December when it was decided that the work should be resumed, getting calcium tartrate from the industrial and Testing Laboratory. 280 lbs. of Calcium Tartrate required by Dr. Varadaraja Iyengar for completing the trial were received here on the 1st instant and Dr. Varadaraja Iyengar was informed on the same date. He seems to have been away at Hassan on some work and has written on the 8th instant that the whole plant may be overhauled and information sent to him. We have written to him to-day that we have taken up the work and that he may call here on or about the 22nd instant to start the work.

Every facility required by him will be given to expedite the trial and get the results. Further report will be sent after Dr. Varadaraja Iyengar arrives here.

Yours faithfully,
THE MYSORE SUGAR CO. LTD.
SD. P.R.BALAKRISHNAN.
General Manager.

TRR/14-3-44

COUNCIL OF SCIENTIFIC AND INDUSTRIAL RESEARCH

No. 8-CSIR(7)/43.

University Buildings,
Delhi, the 30th October 1943.

From

Ch. Abdul Rahim Khan, M.Sc.,

Assistant Secretary, Industrial Research Utilization Committee.

To

The Secretary to the Government of Mysore,
Bangalore.Subject: Extraction of Potash Salts from Molasses.

Sir/Gentlemen,

*four copies
sent to
(1.0000)*

I am directed to forward herewith ~~a copy~~ ² copies of non-technical note on the above process, published under the auspices of the Council of Scientific and Industrial Research, and to say that if any member of your Chamber/any member of your Association/you or any of your clients is/are interested in the industrial exploitation of this process, an application, as in the form enclosed, should be put up so as to reach this office not later than the 13th December 1943.

*nr
20*

Only a limited number of spare copies of non-technical note are available and these can be supplied on request. To save time, however, it is suggested that extra copies if needed may be made by you.

*17426 affs this will be
transferred to the R & I
Sc & Ind Research*

I have the honour to be,
Sir/Gentlemen,
Your most obedient servant,

27/11

27/11 B.S.D-

28/11

Assistant Secretary,
Industrial Research Utilization Committee.

220-21.10.43.
J.P. Singh.

COUNCIL OF SCIENTIFIC AND INDUSTRIAL RESEARCH

NON-TECHNICAL NOTE

ON

THE EXTRACTION OF POTASH SALTS FROM MOLASSES.

Under the auspices of the Council of Scientific and Industrial Research a process has been evolved for the extraction of potash salts from molasses which for sugar factories in most parts of India is now a useless by-product. The investigations made in this respect have yielded encouraging results and the process is now considered ripe for industrial exploitation.

Equipment and Method of Extraction:

The process consists in the incineration of molasses in a specially designed reverberatory furnace at a controlled temperature of 500°—700°C. to avoid loss of potash salts through volatilisation. The ashes obtained

are extracted with steam in an extractor. The extract is then subjected to careful fractional crystallisation at definite concentrations of the liquor to obtain different potassium salts, viz., sulphate, chloride and carbonate at their maximum possible purity. The sulphate is 98% pure as directly obtained. The chloride on re-crystallisation from tap water attains a purity of 99%. The carbonate gives a mixture of 90% potassium carbonate and 10% sodium carbonate on calcination at a suitable temperature. The flow-sheet attached to the note is self explanatory so far as the various stages of the extraction of these salts are concerned.

COST SHEET

Capital investment Rs. 25,000 0 0

Cost of a reverberatory furnace built of fire bricks to stand working temperature of 500°—700°C., with a special design of the flues for the utilisation of heat from the waste gases of combustion ... Rs. 8,000 0 0

Cost of producing 6 cwts. of potash salts from 5 tons of molasses.

Particulars	Quantity	Pre-War		Present Prevailing	
		Rate	Price	Rate	Price
Molasses	5 tons	Rs. -13/- per cwt	Rs. a p. 18 12 0	Rs. -16/- per cwt.	Rs. a p. 37 8 0
Coal	1/4 ton	" 8/- per ton	4 0 0	" 16/- per ton	8 0 0
Labour	...	...	15 8 0		21 0 0
Power	...	...	3 0 0		5 0 0
Depreciation at 10%	...	...	8 6 0	about	10 0 0
Maintenance and repair	...	...	4 0 0		8 0 0
Miscellaneous	...	...	4 0 0		8 0 0
		Total ...	57 10 0	Total ...	97 8 0

Estimated value of the product.

(5 tons of molasses would yield on an average the respective amounts of potash salts indicated below).

Particulars	Quantity	Pre-War		Present Prevailing	
		Rate	Price	Rate	Price
Potassium Sulphate ...	3½ cwt.	Rs. 8/- per cwt.	Rs. a. p. 26 0 0	Rs. 16/- per cwt.	Rs. a. p. 52 0 0
Potassium Carbonate ...	2 cwt.	„ 24/- per cwt.	48 0 0	„ 80/- per cwt.	160 0 0
Potassium Chloride ...	¾ cwt.	„ 8/- per cwt.	6 0 0	„ 30/- per cwt.	22 8 0
	6 cwt.	Total ...	80 0 0	Total ...	234 8 0

			Rs. a. p.		Rs. a. p.
*One foreman ...	Rs. 2/8/- per day	2 8 0	Rs. 3/- per day	3 0 0	
Two chemists ...	„ 3/8/- „	7 0 0	„ 5/- „	10 0 0	
Four bearers ...	„ 1/8/- „	6 0 0	„ 2/- „	8 0 0	
	Total	Rs. 15 8 0		Rs. 21 0 0	

§ The charges would be very much curtailed if heat from gases of combustion be suitably utilised.

Economic Implications and Costing:

The production is considered to be economic if 5 tons of molasses are handled per day. The cost sheet above gives the cost of a reverberatory furnace capable of handling this quantity of molasses, cost of working, the yield of salts and the approximate selling price. The data have been given both at the pre-war and present prevailing prices. This cost sheet has been based on working of molasses from sugar factories producing sugar by carbonation process, because the yield of potassium carbonate, which sells at a much higher price than the other two, is approximately one-third of the total salts in that case.

The cost of working as shown above can be brought down appreciably in actual

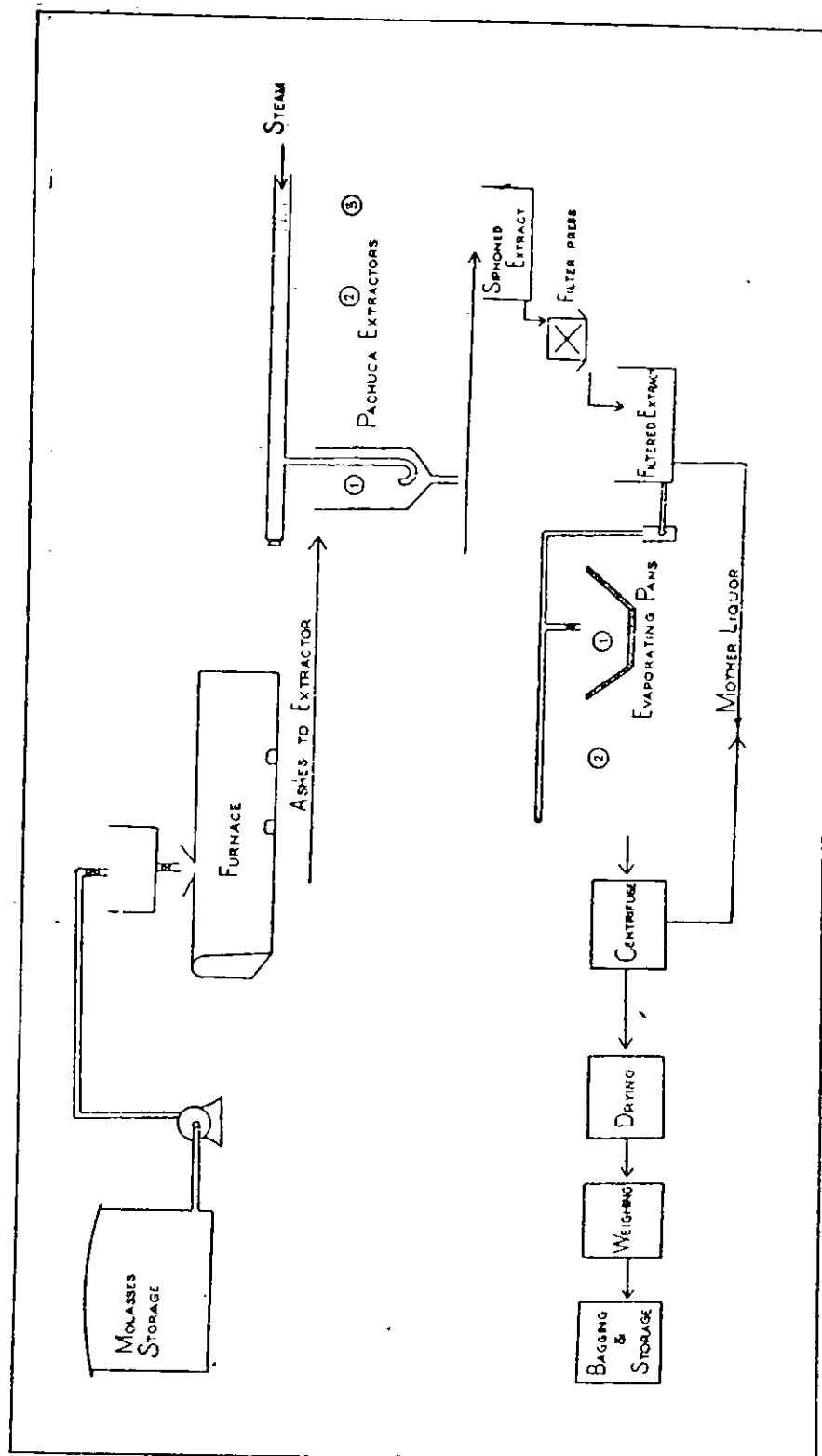
working of the process by the following method:

- (i) Use of molasses as fuel and consequent reduction in the quantities of coal required for incineration;
- (ii) Utilisation of waste gases from reverberatory furnace to raise steam required for subsequent operations of extraction, evaporation, etc.

It may be added that although the process will be more economical if undertaken by any of the existing sugar factories, there is no reason, in respect of either the availability of materials and machinery or details of the process, which should prevent its working as an independent industry near some existing sugar factory. The capital investment in such a case, as indicated in the estimates of cost, will be Rs. 25,000/- approximately.

In view of the fact that potassium carbonate sells at a much higher price than potassium sulphate, it is considered advisable to convert the quantities of potassium sulphate extracted into potassium carbonate by the usual process.

EXTRACTION OF POTASH SALTS FROM MOLASSES [Flow Sheet]



27? 335/43-44

21/8/44
April 1944.

The Secretary,
Mysore Sugar Company Ltd., Bangalore.

xxx

Dear Sir,

Subject: Manufacture of Potassium salts.

+++

I am directed to invite reference to your letter No.E.19/7571 dated the 14th March 1944, on the above subject and to enquire how the matter now stands at present.

Yours faithfully,


Secretary.


THE MYSORE SUGAR COMPANY, LTD.

TEL. ADD.:
"MYSUGAR"

CODES USED:
A.B.C. 5TH EDN. & BENTLEY'S

"SANTHI BHAVAN"
SEPHARDI ROAD.

REF. NO. E-19/ 8752

BANGALORE 27th April 1944.

246
The Secretary,
Board of Scientific & Industrial Research,
BANGALORE.

Dear Sir,

Subject: Manufacture of Potassium Salts.

B.S. 32
(Mr. K. S. R.)
With reference to your letter No. I.P.335/43-44 dated the 21st April 1944 on the above subject enquiring how the matter stands at present, we write to inform you that Dr. Varadaraja Iyengar is reported to have re-started the work about a month ago and expects to submit a detailed report with samples of products in a few days. We shall revert to the subject on receipt of a further report from him.

Yours faithfully,
THE MYSORE SUGAR CO. LTD.

Desubwanayappa
SECRETARY.

DCS.TRR.

2. P. 415/43 44

22nd June 1944.

The Secretary,
Mysore Sugar Company Ltd., Bangalore.

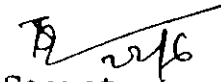
Subject: Manufacture of Potassium Salts.

+++

I am directed to invite reference to your letter No. 19-3752 dated the 27th April 1944, on the above subject and to say that the further report promised therein has not yet been received. I am to request you to be so good as to expedite the forwardal of the same and to also to intimate if the work is still in progress.

An early reply is requested.

I have the honor to be,
Sir,
Your most obedient servant,


Secretary.



THE MYSORE SUGAR COMPANY, LTD.

TEL. ADD.:
"MYSUGAR"

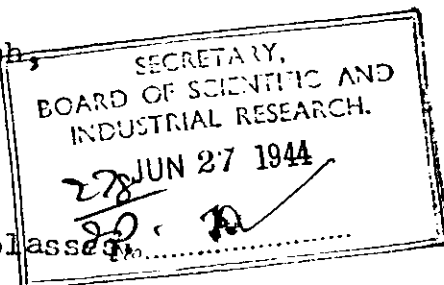
CODES USED:
A.B.C. 5TH EDN. & BENTLEY'S

"SANTHI BHAVAN"
SESHADRI ROAD

REF. NO. E-1910256

BANGALORE, 24th June 1944

The Secretary,
Board of Scientific & Industrial Research,
BANGALORE CITY. *Gen & Asst. Secretariat,*



Dear Sir,

Recovery of Potash from Molasses

With reference to your letter No.I.P/
410-4344 dated the 22nd June 1944 requesting us to
expedite the forwardal of the report on the above
subject, we send enclosed a copy of letter dated the
23rd June 1944 received from Dr. A.V.Varadaraja Iyengar,
Bio-Chemist, Indian Institute of Science, Bangalore
promising to send the detailed Report in the matter
early in July next. We shall revert to the subject
on receipt of the Report in question.

Yours faithfully,
THE MYSORE SUGAR CO.LTD.

Subbarayappa
SECRETARY.

TRR

Enc. 1.

Copy of letter dated the 23rd June 1944
received from Dr. A.V.Varadaraja Iyengar,
Bio-Chemist, Indian Institute of Science,
Bangalore.

Recovery of Potash from Molasses.

I regret the delay in acknowledging
your kind letter No.E-19/9886 of the 10th
instant enclosing the report of Mr.Rajan.
I have been somewhat pre-occupied with
some urgent work. I could not therefore
write the report for being forwarded to
Government. I shall study the results
and forward the report to you as soon
as my present work is completed, having
undertaken the same. I believe I
will be able to send the report early
in July next. I shall be greatly
obliged to you for kind excusing me
this delay, which has been unavoidable.

Thanking you,

Yours faithfully,

Sd .A.V.Varadaraja
Iyengar.

COPY.

THE MYSORE SUGAR CO.LTD.

Devarayappa

SECRETARY.

TRR-24/6/44.

T. 146
To. 5.10.44

The Secy.
Mysore Dyar Coll. Lm.
Blore

Sir,
Recovery of Potash from
molasses.

I am directed to advise
you to your letter No. 8. 19/10/256
dated the 24th June 1944 &
this office reminder on 9.9.44, on
the above subject and to
request you kindly to expedite
your reply in the matter.

I. A.

To
37/10
By
37/10

JP. 146

Camp-Mysore,

5th October 1944

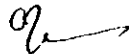
The Secretary,
Mysore Sugar Company, Ltd.,
Bangalore.

Subject: Recovery of potash from molasses.
+++

I am directed to invite reference to your letter No.E.19/10256 dated the 24th June 1944 and reminder on the 9th Sept. 1944, on the above subject and to request you kindly to expedite your reply in the matter.

I have the honor to be,
Sir,
Your most obedient servant,


Secretary.



53-40-3

5933

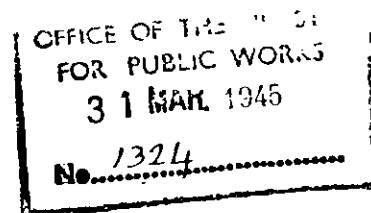
A. V. VARADARAJA IYENGAR,
BIO-CHEMIST.

Tel. Address:
Dr. Varadarajan,
Malleswaram.

Ref:

Date 28 March 1945

The Minister for Industries and Commerce,
Old Public Offices,
Bangalore City.



Dear Sir,

Re: Recovery of Potash Salts from Molasses.

In accordance with the resolution of the Board of Industries and Commerce on 25th Nov. 1940, as conveyed to me in the Secretary's letter No. nil dated the 7/9th Feb. 1941 communicating this resolution that pilot plant trials may be conducted either at the Mysore Sugar Co. or the I.T.L. Bangalore, and in pursuance of another direction as contained in the Secretary's letter No. 1207/41-42 that the report be forwarded through the Sugar Co., I had forwarded a report of my work sometime in August 1944 to the Chairman of the Mysore Sugar Co. In the course of my interviews when I pointed out that I should be willing to discuss the results of the investigation with a view to further adoption, I was informed that there was no one competent at their end to give an opinion in this respect. I was required to forward my report so that the Chairman may go through the same at his leisure (vide letter NO. E-19/3800 dated 7th August 1944 enclosed herewith.) I understand that the report has since been forwarded to the Government as desired by them, and the Sugar Co.'s recommendation that they are not encouraged to take up the proposal. I am sure I would be given an opportunity to discuss the results and their importance, so that it may be taken by the Government for adoption in the Mysore Sugar Co.

In forwarding my report along with my letter of 8-8-44 (copied) I had requested the payment of Rs. 600/- agreed included in my letter dated 20th Feb. 1942 and accepted by the Sugar Co., in their letter dated 25-2-1942 (both letters enclosed herewith). In reply, I was given Rs. 300 as a special case (letter No. E-19/3800 dated the 7th Nov. 1944 enclosed herewith). I had requested the Chairman in my letter of the 7th Nov. 1944 for payment in full as this was agreed to before the trials started but was informed that it was not possible to reconsider the claims (in their letter No. of 25th Nov. 1944. (letters enclosed herewith). When I interviewed you in December last about this, you wanted me to place the relevant facts for your kind consideration, which I am doing now.

I am obliged to bring this matter to your notice, because the investigation was undertaken on behalf of the Government by the Mysore Sugar Co. The Government had always taken a keen interest in this matter. Thus, they primarily resolved to try the experiments. When the Sugar Co., and myself could not come to any working arrangements prior to undertaking the trials, the Government wanted me to alter my report and submit the same to the Sugar Co. (vide Secretary's letter No. 168 dated 8-9-1941 and the Minister's letter No. D.O. No. 52 dated the 1st Sept. 1941 to Prof. V. Subrahmanyam of the Indian Institute of Science).

continued.---

When this renewed proposal was again not accepted by the Sugar Co., the Government directed me to meet the new Chairman in Jan. 1942 and submit fresh proposals which I did in February 1942 (letter enclosed). This was considered by the Sugar Co., favourably in 1942, vide their letter No. E-19/6550 dated the 25th Feb. 1942. I had included in my above letter a payment to me of the sum of Rs. 600/ after discussing it with the Chairman and Mr. A. S. S. Rai Mudaliar when we met in January 1942, for conducting the trials. If this had not been agreed to, I would not have claimed for this amount.

Again, when the Mysore Sugar Co., decided to discontinue the trials in Sep. 1943, the Government wanted the experiments to be completed at reasonable cost, (vide the Sugar Co.'s letter E/4579 dated 4th Dec. 1943 (letter enclosed) and G/2332 dated 5th Dec. 1943). I completed the trials accordingly and submitted my report mentioned above. . . .

In view of the fact that the Government had always their direct interest in this work throughout this period of 3 years and more when there was a difference between me and the Sugar Co., and me, I feel constrained to approach you with a request to kindly help me with the sum of Rs. 300/ still unpaid to me by the Sugar Co. I must add that this is towards the actual time put by me for the work I had undertaken. It does not count to any royalty or other bonus etc. I am certain you will not deny me more or less what I might call my wages for the work accepted by the Sugar Co. I shall remain ever grateful to you for his kind help. Thanking you, Sir,

I remain,
Yours very truly,

N. S. S. Rai Mudaliar

Enclosures. 9 (Nine) letters.

MS

D 486 D. P. 53-40-4 of 16

G. R. S. App. F. G. 3.

GENERAL AND REVENUE
SECRETARIAT.

(Continuation sheet draft form.)

He 5933

To.

The Secy
Mys. Lyar Coy
Bhor

Subj: Mfr of Potamini
Sals. by Dr. A.
Varadareyengar

Dear Sir,

I am desired to
inform you of your letter
no. E. 19/3403 dated
20/10/1947, to the
Secy. Bd of Sc & Sub
Re. an the above
subject, and to inform
you that to forward
a copy of the agreement
if any or the terms
on which Dr. Varadarey
Lyar's services were
engaged for the above
work by the Coy and
the ~~Government~~ of the Board.
An. - Secy.

20. 10. 1947

Yours

Y as Hs

2-6/7

2/12/47
2-6/7

2-P 53-40-5 512
TELEPHONE NO. 2133

FACTORY:
MANDYA (MYSORE STATE)

THE MYSORE SUGAR COMPANY, LTD.

TEL. ADD.:
"MYSUGAR"

POST BOX No. 64

CODES USED:

A.B.C. 5TH EDN. & BENTLEY'S

"SANTHI BHAVAN"
SESHADRI ROAD

REF. NO. 439/247.

BANGALORE, 18th July 1945.

T. Shamanna, Esq., M.A.,
Assistant Secretary to Government,
Development Department,
BANGALORE.

Dear Sir,

BS JR
18/7/45
Manufacture of Potassium Salts by Dr. A.V. Varadaraja
Iyengar.

With reference to your letter No.D-486/IP dated
the 16th July 1945 asking for a copy of the agreement if
any or the terms on which Dr. Varadaraja Iyengar's services
were engaged for the above work and of the Resolution of
the Board, we write to inform you that there ~~is~~ no agreement
on which Dr. Iyengar's services were engaged for the above
work. But his letter dated the 21st February 1942 containing
his detailed proposals in connection with his experiments
appears to form the basis of the Resolution passed by the
Board on the 23rd idem.

A copy of the letter in question is sent enclosed
as desired together with a copy of the Resolution of the Board.

Yours faithfully,
THE MYSORE SUGAR CO. LTD.,

Subbarayappa
SECRETARY.

Enc. 2.
DCS.TRR.

Extract from the proceedings of the meeting of the Board of Directors held at Bangalore on the 23rd February 1942.

--

SUBJECT NO.VI- Reconsideration of the scheme of recovery of Potash from Molasses.

--

"Read Resolution No.VII passed by the Board at their meeting held on 22nd Dec. 1941 in regard to the modified proposals of Dr. A.V.Varada Raja Iyengar, of the Indian Institute of Science, Bangalore, in connection with his scheme for recovery of Potash from Molasses.

Read letter dated 20th Feb. 1942 from Dr. A.V.Varada Raja Iyengar, submitting his further revised proposals in regard to his scheme for recovery of potash from Molasses.

RESOLVED that an expenditure of Rs.5,000/- be incurred for carrying out pilot plant experiments connected with the extraction of potash from molasses as per the scheme submitted by Dr. A.V.Varada Iyengar, which should be further examined by Mr. S.G.Sastri, Director of Industries in Mysore and Mr. P. R.Balakrishnan of the Mysore Sugar Co. Ltd.,

RESOLVED further that an employee of the Mysore Sugar Company, Ltd., be associated with Dr. Varadaraja Iyengar while the operations connected with the extraction of potash from Molasses are being carried out at Mandya".

Sd. T.V.A.Isvaran.

Chairman.

COPY.

THE MYSORE SUGAR CO. LTD.,

K. Subbarajappa

Secretary.

TRR-18-7-45.

Copy of letter dated 21-2-42 addressed to Rajasevaprakashta T.V.A. Isvaran, Chairman & Managing Director, M.S.Co.Ltd., Bangalore by Dr. A.V.Varadaraja Iyengar, Biochemist, Indian Institute of Science, Bangalore.

--

Dear Mr. Isvaran,

I write to acknowledge with thanks your courtesy for the Meeting on the 22nd Jan. and for the discussion regarding the recovery of Potash from Molasses. I regret very much the delay in writing to you as arranged at the meeting, as I had been preoccupied with the collection and processing of green tamarinds. I appreciate your kindness and generous remarks made during your subsequent visit to the Industrial and Testing Laboratory ~~and~~ to acquaint yourself with the operations carried out there. I hope you will forgive me this unfortunate delay.

At the Meeting at which Mr. B.G.Appadorai Mucaliar also was present, it was understood that I would formulate a proposal in respect of the trials for potash recovery from molasses, for your kind consideration and approval. This would include all items of expenditure such as capital charges, working costs, my allowance etc. The business terms for adopting this process were to be deferred to a later date subsequent to the trials. With a view to enable you to consider the proposal, I am including herewith a rough cost sheet. This is based on the plan and equipment indicated in my letter to your predecessor, dated 10-2-41, with some modifications, which relate to the length of the shed and to the purchase of tamarind fruits instead of tartaric acid in the market, as was understood last year.

Cost Sheet.

a) To cost of equipment needed for recovering potash sulphate from 5 cwts. of molasses per day	Rs.2,000/-
To erect a temporary shed, 50'x20'x16'	900/-
To equipment for tartaric acid extraction from tamarinds and to purchase of tamarind fruits	550/-
b) To working charges at Rs.10/- per day for 40 days	400/-
To labour in the initial stages	50/-
c) Allowances to Dr. Varadaraja Iyengar for the entire period.	600/-

	4,500/-
Miscellaneous ..	250/-

	4,750/-

P.T.O.

- 2 -

The shed has been increased in length to provide more moving space. As the cost of the equipment has been fixed at 1941 prices, it would appear necessary to increase it approximately.

In effect, I think we may not exceed Rs.5,000/-. I hope it will now be possible for you to give this proposal your earnest and early approval.

Thanking you and with kindest regards,

I Remain,
Yours sincerely,

Sd. A.V.Varadaraja Iyengar.

COPY.

THE MYSORE SUGAR CO. LTD.,

Desubbarayappa

Secretary.

TRR-18-7-45.

D 12 / 8253-100

11th Oct

To.

The Chairman
Mys Hyas Company Ltd
Bangalore

Sir.

Subj: Mfg of Solanum Salt
by Dr. R.V. Varadarajapuram

With refce. to ~~your~~ ^{the} letter No. 489 dated 18.7.1945 ~~of the Mys Hyas Co. Ltd~~ ^{Secretary, ~~the~~ as the above} subject, I am directed to state that the question of continuing the expts or otherwise is ~~separately~~ under consideration.

As regards the remuneration of Dr. Varadarajapuram, I am to ^{kindly} ~~request~~ you to place the matter before the Board of Directors ^{of the Co.} giving an opportunity to

Dr. Varadrajalingar to
present his case & come to
a decision in the matter.
The action taken may be
reported early.

Lee.

to
1891us
... 2. Deeds.

9/9

Mr. C.E.Moronha, M.A.,

J P. 53-40-6

Camp:Mysore. 16/10/

5.

02486
- 19/10

Dear Sir,

Subject:- Recovery of Potash Salts from
molasses - Scheme of Dr. A.V.Varadar-
ajaiengar.

In inviting reference to your D.O. letter No. D.1744 dated 8th December 1943, to the Secretary, - Industrial Research Board (copy enclosed) recommending the taking up of the scheme mentioned above, I am desirous to state that Dr. Varadaraja Iyengar has since conducted the investigations at the Mysore Sugar - - Factory at Mandya and copies of his reports and the review of the General Manager, Sugar Company, thereon in original are sent herewith.

I am to request you to be so good as to examine these papers and to furnish your remarks as to whether it is worthwhile pursuing the experiments further or whether they may be dropped.

The original papers sent herewith may be kindly returned when done with.

Yours sincerely,

2/76/4

Sir J.C.Ghosh, D.Sc., F.N.I.,
Director, Indian Institute of Science,
B a n g a l o r e.

Jsk.

Mr. T. Shamanna, M.A.,
Assistant
Developmentxxxx

S.P. 53-40-7.

Development Department
15th October 1945

xxxx

D. 2485 -
- 19/10

Dr. A.V. Varadarajalingar, B.A., D.Sc.,
Bio-Chemist,
Malleswaram P.O.,
BANGALORE CITY.

Dear Sir,

Re: Recovery of Potash Salts from Molasses.

With reference to your letter dated 28-3-1945 to the Minister for Public Works. on the above subject, I am desired to state that the question of the payment of the remuneration due to you, has been referred to the Chairman, Mysore Sugar Company, for placing the matter before the Board of Directors giving you an opportunity to present your case and come to a decision in the matter. You may therefore, get into touch with the Chairman.

Yours faithfully,

T. Shamanna

For Secretary to Government
Development Department.

Jsk.

J.P. 53-40-6

85 I B

2081-60
Dr. A.V. Varadarajaperumal
B.A. Dte.
Bio chemist.
Chettinam P.O.
B. city

Dear Sir

Recovery of Lotam Sales-
from Molam.

With reference to your letter
dated 28/3/1965 to the
Mun. P.O. on the above subject,
I am desired to state that
the question of your the
payment of the balance
remuneration due to you,
has been referred to the
Chairman, Mys. Dy. Co.
for placing the matter
before the Board of Directors

376. G.P. 53-40-9

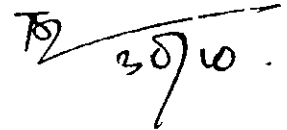
30th October-1945

Dear Sir,

Refce: This office letter No.D.2485
dated, the, 19th October 1945.

As desired by you, I am returning herewith
the original correspondence forwarded by you with
your letter of the 28th March 1945, the receipt of
which may be acknowledged.

Yours sincerely,

 30/10.

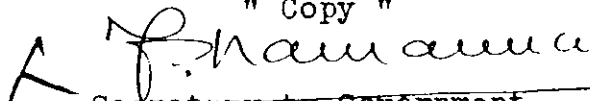
Dr. A.V. Varadarajalingar, D.Sc.,
Bio-Chemist,
Majleswaram P.O. Bangalore.

Copy of D.O. letter No.D/1744 dated 6th December 1940 from Sir J.C.Ghosh, Director of Indian Institute of Science, Bangalore, to Mr. K.Parthasarathy, Secretary, Industrial Research Board, Govt. Electric Factory, Bangalore.

Kindly refer to your letter No.55/40-1 dated 26th November 1940. I have discussed the matter with Dr. A.V. Varadaraja Iyengar. I wanted to be sure that the Molasses after treatment with tartaric acid would yield residues which could be fermented for the manufacture of alcohol. Dr.Varadaraja Iyengar has carried out experiments along this line and claims that the residue of the molasses after treatment with tartaric acid is as good as fresh molasses for the manufacture of alcohol.

I recommend that this scheme of putting up a pilot plant for the extraction of potassium from molasses as worked out by Dr. Varadaraja Iyengar may be taken up. In this connection I may point out that Dr. Varadaraja Iyengar expects an honorarium of about Rs.1,000/- for conducting the pilot plant investigations. The total expenditure, therefore will come to about Rs.4,000/-.

" Copy "


Secretary to Government,
Development Department.

Jsk.

TEL ADD.
"MYSUGAR."

2
FACTORY:
MANDYA (MYSORE STATE)

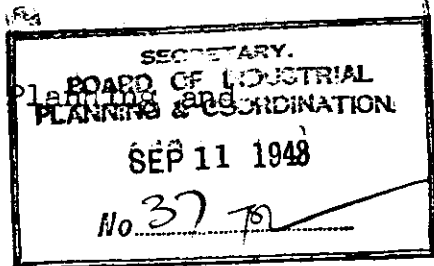
THE MYSORE SUGAR COMPANY LTD.

CODES USED:
A.B.C. 5TH EDN. & BENTLEY'S.

Telephone No. 2133
Jayachamaraja Wadiyar Road,

OUR. REF. NO. E-19/2167 BANGALORE CITY....10th...Sept...194 3.

The Secretary,
Board of Industrial & Planning and
Co-ordination,
BANGALORE.



Dear Sir,

Subject: Manufacture of Potassium
Salts by Dr. Varadaraja Iyengar.

In continuation of our letter
No. E-19/2128 of yesterday's date, we send
enclosed a copy of the report received from
Dr. A.V. Varadaraja Iyengar on the work done
by him regarding the manufacture of Potassium
Salts at Mandya together with a copy of
the remarks of our General Manager on the
subject.

We are of opinion that the work which
has already proved costly may be suspended.

Yours faithfully,
THE MYSORE SUGAR CO. LTD.

Subbarayappa.
SECRETARY.

ENC.2.
DCS.T RR.

Copy of letter No.G/992 dated the 9th Sept. 1943 from the General Manager, M.S.Co.Ltd., Mandya.

Dear Sir,

Re. Recovery of Potash from Molasses.

In connection with the experimental work done so far, a sum of nearly Rs.3,000/- has been spent towards equipment, erection of the plant, stores supplies and labour charges. Dr. Varadaraja Iyengar did assiduously apply himself to his work while he was here.

As may be seen from his report, he has so far been processing only the tamarind with a view to get the tartaric acid in it in a form suitable for extracting the potash from the molasses. He has stated in his letters dated the 26th and 28th August 1943 that the main cause for the poor progress in the work has been that he has chosen ripe tamarind for his raw material for getting tartaric acid, when it was found to be an unsuitable material for the purpose by his Professor 20 years ago. I am of the opinion that he ought not to have wasted his time in trying a proved defective process. At this rate, it is not worth while continuing the work any more.

Dr. Varadaraja Iyengar, in the course of his conversation, had stated that he has been able to process green tamarind more successfully in the Government Industrial and Testing Laboratory. Under the circumstances any further attempt to recover potash from molasses may be made only if Dr. Varadaraja Iyengar can get the required quantity of tartaric acid from the Government Industrial and Testing Laboratory. Otherwise, the work may be suspended.

The papers sent by you are returned herewith.

Yours faithfully,
THE MYSORE SUGAR CO.LTD.
SD. P.R.BALAKRISHNAN,
General Manager.

COPY,

TRR.10/10/43.

Subbarayappa

4

Report on the experiments relating to the recovery of
Potash salts from Molasses.

The experiments relating to the pilot plant trial commenced towards the last week of May 1943. Although the equipment was not complete in all respects, certain preliminary trials had to be made essential for the first stage of the process under examination. This process for the sake of convenience be divided into two major sections, viz., the separation of potash in molasses as Cream of Tartar through the addition of tartaric acid extracts or solutions and the recovery of potash from cream of tartar as well as of tartaric acid in a suitable manner, the latter to be used over again to treat fresh batches of molasses.

It will be obvious that for successfully accomplishing the first stage, both molasses and tartaric acid will have to be secured to the desired consistency, concentration and purity. The report under consideration includes the experimental investigations relating to these two items, viz., securing a good clarification of molasses and preparation of a concentrated extract or solution of tartaric acid from tamarind fruits. Molasses as it is collected and stored, cannot be employed as such for the trials without being clarified, in as much as it contains a good percentage of suspended impurities. It may be said to consist essentially of calcium salts which will seriously affect the course of the reaction intended to be brought about. The quantity of this impurity may be roughly reckoned at 1% on an average on molasses which contains generally 3/4% Potash. In addition to this, molasses is also found to contain sulphurous acid arising from the sulphitation of cane juice. The removal of this acid which may be as high as even 0.6% in certain cases, is necessary for this process. Clarification of Molasses therefore aims at the elimination of these two interfering factors.

EXPERIMENT NO.1. Clarification of Molasses. The removal of insoluble calcium salts is generally effected through diluting molasses and through settling down of the insoluble material. For reasons which will be gone into at a later stage, this dilution cannot be large also. In addition, certain physical treatments help the settling down of these impurities.

(a) Dilution with equal volume of water. 1 Vol. of molasses (90 gallons) was mixed with 1 Vol of water (90 Gals) in a cylindrical vessel with a conical bottom for about 1½ hours and allowed to settle. Samples were taken in jars at periodic intervals of half an hour to determine the minimum period necessary for the complete sedimentation of impurities without fermentation setting in. Similar tests in the laboratory showed that an interval of 5 hours was needed. In these largescale trials, it was found that even after 8 hours, the sedimentation was incomplete.

The above experiment was repeated, the diluted molasses being heated for a short time till it reached a temperature of 70, 80, 90 degrees and a momentary boiling. It was found that initially

that the boiling of molasses after dilution even though for an instant enabled the complete sedimentation of the calcium salts. Subsequently it was found that maintaining the diluted molasses even at a temperature of 80--85° for about 15 minutes resulted in a rapid settling down of the undesirable components. Generally a time interval of about 6 hours was necessary, when the diluted molasses was heated. The specific gravity of molasses at this dilution is generally about 1260.

(b) Dilution with half the volume of water. 90 gallons of Molasses were diluted with 45 gallons of water to keep the concentration of potash at high level, the solution being heated to 80° after dilution. The specific gravity of the solution was found to be nearly 1300 but in this case the time taken for the precipitate to settle down in the dilution tank was as much as 26 hours. Although this is rather a long interval, this could be reduced to under 20 hours by certain manipulative details.

(c) In another trial, 3 parts of molasses were mixed with 2 parts of water and heated to boiling for a moment. The Specific gravity of the solution after cooling was found to be about 1280 and the time taken for sedimentation to be complete was nearly more than half a day--the maximum time being about 16 hours.

The total volume secured in each case will be slightly less than the sum total of the two ingredients mixed.

EXPERIMENT NO.II. Removal of Sulphur dioxide in the molasses was effected through addition of calcium carbonate reckoned roughly at the rate of 1 lb. per cwt. of molasses. In addition to removing the sulphurous acid, certain other organic acids also are removed by this method. Other methods of removing sulphur dioxide were not tried.

EXPERIMENT NO.III. Preparation of Extracts or solutions of Tartaric acid from tamarind fruits for treating diluted molasses. It has been shown by me earlier that the best raw material for this experiment was featured in the raw tamarind fruits. Unfortunately it could not be secured in Mandya during the last season at reasonable rates. Since about 7 tons of green mature tamarind fruits were needed, arrangements were made with the kind consent of the Government Director to treat about 10 tons of raw tamarind at the Government I.T.L. for these trials. It was however impossible to treat any quantity. In order to avoid delay--which will mean 1 year--the utilisation of the ripe fruits was thought of and the report deals with the experiments conducted in that respect. It must be stressed at this stage that the object of was not one of getting any acid extract somehow but to secure an extract rich in respect of tartaric acid for treatment directly with molasses. evaporation of dilute solutions being out of consideration for want of adequate evaporating equipment.

(a) Leaching of tamarind fruits with water. Ripe tamarind fruit contains free tartaric acid to the extent of 5 per cent or ~~there~~ thereabout the quantity varying rather widely. 6 cwts. of ripe tamarind fruits were initially employed for the purpose. The experiment was designed as follows: A quantity of fruit approximating to 1 cwt. was treated with 100 gals. of water and mashed for some hours so that the acid may get dissolved. If the mash is allowed to percolate, it will

be advantageous, because the liquor will then be clear. As percolation is impossible because of the high gummy matter present therein, it was considered necessary to squeeze out of the juice as much as possible. Such juice was very small in quantity, neither was it clear. The difficulty with the raw material is that that the pulp absorbs several times its weight of water and swells and does not release the liquid under pressure ordinarily to be obtained in squeezing. Therefore the pulp was diluted with water roughly in the proportion of 150 gals to 50 lbs. of material and the mash allowed to settle. A certain amount of clear liquid was secured. The acid content of this extract was found to be 0.35%. This liquid which could be realised to the extent of 30 gals. was not adequate. Therefore the residual pulp was centrifuged off in the hope of securing further quantities of the juice. The essential defect in these experiments is the centrifuge which was already available in the factory but which was found on use not to conform to a standard pattern. Greatest trouble had been experienced with it, although it was needed at every stage for separating solids from liquids.

The combined extracts obtained above were mixed with a fresh batch of the pulp which had already been softened with water and the procedure outlined above repeated until about 5 cwt.s. were treated. I had secured thus 170 gallons of an extract containing approximately 0.75% free tartaric acid. In other words, I had extracted only 11 lbs. of the tartaric acid. This was added immediately to 5 cwt.s. of diluted molasses (with equal volume of water). There was a small quantity of precipitate mixed with some quantity of fibrous material amounting to 5 lbs. After separation, the liquor was neutralised with calcium carbonate to recover tartaric acid contained therein. The dilution is so large that cream of tartar formed, was not precipitated completely being somewhat soluble.

(b) Recovering tartaric acid as lime tartrate. Since the above trials did not facilitate the recovery of tartaric acid from the pulp in a concentrated form, alternate methods of recovering tartaric acid had to be adopted. With this end in view the residual tamarinds from the 6 cwt.s. of the treated pulp was treated with calcium carbonate prepared from ~~the extracted pulp~~ lime used in the factory. For this purpose, lime was exposed on steel plates to the carbon dioxide from fermentation tanks. 150 parts of tartaric acid require 100 parts of pure carbonate to form 260 parts of lime tartrate. The neutralisation is controlled by the nonproduction of carbondioxide. This was checked against litmus paper which had to be prepared in the laboratory, by me for this purpose. It was subsequently found that the carbonate prepared as above was highly contaminated with lime and had to be controlled adequately. The neutralised material was centrifuged and the solid residue collected and dried. Unusually the residue was dark coloured in the earlier stages of the work. Subsequently through proper control a satisfactory product was obtained from about 1 ton of the tamarind pulp. The dried material ~~was so obtained~~ was about 600 lbs. including the insoluble dry pulp of the fruit and also lime tartrate.

(c) Recovery of acid extract from lime-tartrate--containing dry pulp. The dried pulp was treated in batches of 100 lbs. each with Sulphuric acid in leadlined tanks provided with lead coils. Each batch sample produced carbondioxide on the addition of acid. The time of treatment was 2 hours maintained at not more than 80°. The factors governing

this conversion may be grouped as follows: 1) The degree of fineness of the precipitate; 2) the temperature of the reaction; 3) the time for which the temperature is kept; 4) the rate of stirring and 5) the excess of sulphuric acid--the first one could not be controlled at all. The other factors were closely adhered to from batch to batch. The total quantity of sulphuric acid added amounted to 205 lbs. of 35° Be corresponding to about 80 lbs. of pure acid. Assuming that this would convert about 180 lbs. of lime tartrate contained in the dry pulp (roughly estimated), the quantity of tartaric acid solution was added to small batches of molasses 2 cwts. at a time. Even here, probably, on account of the dilution, the precipitation of potash was not evident. Hence the acid precipitated as lime tartrate through added calcium tartrate. The precipitate so obtained amounted to 393 lbs. The precipitate was tested later because of certain discrepancies and found to react alkaline. This was treated with about 80 lbs. of pure sulphuric acid in batches at a dilution of 50%. It was found that the liquor after the usual methods of testing was fairly weak, showing that the added sulphuric acid had neutralised the carbonate only and not reacted with the tartrate.

d) Work in progress. In view of this defect, it has been found necessary to critically examine the dried pulp as well as the lime tartrate precipitate to secure tartaric acid in a fairly pure concentrated condition. Thus far, only 1 ton of the pulp has been treated and the tartaric acid realised from this would be mixed with molasses. The experience gained by this would be taken advantage of for processing an additional 1 ton of the tamarind pulp for the regular trial.

I wish to express my gratefulness to the General Manager, Mysore Sugar Co. for his kind encouragement in the course of this work, particularly when difficulties in the control of the operations were experienced.

TRR/10/10/43.

A P P E N D I X.

Date	Tamarind fruit used	Quantity of the pulp	Total amount of dried material	Time of treatment in all
29-5-43	4 bags	Appr. 450 lbs.	594 lbs.	The time of drying the material after the treatment included also
30-5-43	2 "	" 230 "		
12-6-43	2 "	" 222 "		
14-6-43	2 "	" 224 "		
18-6-43	2 "	" 224 "		
20-6-43	2 "	" 224 "		
27-6-43	2 "	" 224 "		
28-6-43	2 "	" 224 "		
28-6-43	2 "	" 224 "		

Total time to complete the drying etc. was about 45 days.

T a b l e II

Date	Quantity of dried material treated	Sulphuric acid added.
15-7-43	60 lbs.	In terms of concentrated acid, between 85 and 86 lbs.
16-7-43	96 "	
16-7-43	98 "	
25-7-43	100 "	
6-8-43	90 "	
8-8-43	50 "	

T a b l e III

Treatment of Lime Salt.

Date	Weight of lime salt (Lbs.)	Weight of Sulphuric Acid (41°Be)
18-8-43	73½	59½ lbs.
19-8-43	50½	30 "
20-8-43	50	-
21-8-43	61½	25 "
22-8-43	158	65 "

These precipitates were found to contain quite a high percentage of fr/ calcium carbonate and some lime, the quantity of which was found to be on a/ as much as over 50%. On that sample, the 65 lbs. of acid added had not c/ neutralised the carbonate present initially. Therefore a second treatment/ precipitates with acid has to be repeated and this work is being tested at/ stage, is in progress.

Sd. A.V. Varadaraja
5/9/1943

Copy of letter No.Dis/1299 dated 5-10-44 received from the General Manager, M.S.Co. Ltd., Mandya.

Dear Sir,

Re: Recovery of Potash from Molasses and the Report of Dr. A.V. Varadaraja Iyengar on the same.

We thank you for your letter No.E-19/2607 dated 11th Sept. drawing our attention to your previous letter No.E-19/994 dated 14th August 1944 and desiring us to let you have our remarks on the above mentioned report.

We have gone through the letter dated 8-8-44 of Dr. Varadaraja Iyengar as well as his report carefully and have to make the following comments before the scheme could be put into operation on a manufacturing scale.

Firstly, regarding the object of the trials undertaken with reference to item 'B' of his Report, Viz. fermentability of the Molasses treated with tartaric acid without loss in the yield of alcohol as compared with the raw untreated molasses:

He has observed that the treated molasses and untreated molasses were subjected to alcoholic fermentation trials and that they gave identical results. It has to be pointed out that this test was done on a laboratory scale only. While this no doubt proved that the removal of Potash from Molasses, by the method followed, did not have deleterious effect on the alcoholic fermentation of molasses, it did not prove that there was no loss of sugars, and consequently no loss of alcohol. No estimations of fermentable sugars in the molasses that was handled ~~on the factory scale~~ were carried out as far as we are aware either at the beginning or before sending it for fermentation. The importance of these tests need hardly be emphasised, the molasses being the main source of alcohol any loss of sugar in the above process would mean lower yield and consequently higher costs of production of alcohol. Hence before adoption of this process on a large scale, the following data will have to be obtained:- (a) The fermentable sugar balance, starting from raw molasses to the stage at which the effluent is handed over to the Distillery; (b) The fermentation trials on a plant scale of the so-treated molasses to prove (i) that it will have no deleterious effect on the alcoholic fermentation of molasses, and (ii) if the time of fermentation is unaffected.

In the prelude of his Report on page 1, he observes 'that this is a chemical process involving chemical reactions requiring adequate control at all stages and collateral analysis of the different products employed as well as obtained. The facility for such control and analytical work was very limited indeed'. We have to remark that this is not correct. We have a laboratory equipped for another chemical industry, and all the facilities like apparatus, chemicals and personnel available were placed at his disposal. If there were any difficulties they should have been brought to the notice of either the Chief Chemist of the Distillery or to the proper authorities at the right stage and overcome rather than mention about the difficulty when the trials are supposed to have been over. We are at a loss to understand as to how he can sum up that the difficulties experienced to

P.T.O.

concentrate on the economy of the process, can be overcome on a plant scale operation when these difficulties could not be overcome on a semi-plant scale operation itself. We think the object of the trials was intended to prove the economy of the process so as to secure a data regarding the probable costs of production: This has not been achieved.

Finally, the estimate re. Cost of production was based on treating the molasses with a concentrated extract of green tamarind whereas now Lime Tartarate has been used. The recovery of Potash has been poor. As to how a higher recovery is expected, before establishing the fact, is not clear. As the cost of production of Potash is mainly dependent on (1) recovery and (2) cost of raw materials and (3) the loss or adverse effect on the alcoholic fermentation of molasses, unless the cost worked out on this basis is obtained it would not be desirable in our opinion to recommend the adoption of this process on a commercial scale. Besides, should the inventor propose the use of tamarind extract, that the use of the same will not have any adverse effects on the alcoholic fermentation of molasses will ~~also~~ also have to be proved.

With the above remarks, we return herewith the Report of Dr.A.V. Varadaraja Iyengar.

Yours etc.,

TRR/20/10/44.

Copy
Hru.
27/10/44

TRIAL EXPERIMENTS ON THE RECOVERY OF POTASH SALTS FROM MOLASSES.

The present trials were undertaken with a threefold object in view, viz.,

- A. The recovery of Potash present in molasses primarily as Cream of tartar through added tartaric acid and the subsequent conversion of the purified potassium acid tartrate to potassium sulphate and lime tartrate, from which tartaric acid is regenerated for use again.
- B. The fermentability of the molasses so treated without loss in yield of alcohol, as compared with the raw untreated molasses.

and C. The economy of the process as on a pilot plant scale.

While it was possible for me to study the process in respect of items A and B, I found it difficult to concentrate on the economy of the process on account of unexpected difficulties during the trials. This is a chemical process involving chemical reactions requiring adequate control at all stages and collateral analysis of the different products employed as well as obtained. The facility for such control and analytical work was very limited indeed. In most cases only rough data could be secured. Even then, the trial lasted longer than anticipated. This difficulty could be overcome and proper arrangements provided, when the work is done on a manufacturing scale. Secondly, in the absence of a suitable filter press, a centrifugal machine of the desired size was available in the factory and made use of in these trials. Unfortunately, this was not a standard pattern and hence caused considerable handicaps in the course of the trials resulting on many occasions loss of valuable ingredients like tartaric acid, potash sulphate etc. and affecting the yield thereby. This vital equipment had to be overhauled many times and yet it was very defective. Again, the difficulty in the continued supply of steam hampered the work and led to losses.

It must however be emphasised that the various units of equipment for the pilot plant trials were planned for a continuous run except for evaporating the weak tartaric solution. Allowances have been made in the experiments for the loss in yield of potassium acid tartrate on this account. The present report deals with three experiments, of which the last was carried out to secure specific data.

A. Recovery of Potash from Molasses as Sulphate. This is effected in two stages. Primarily, the soluble potash in molasses is secured as an insoluble compound through added tartaric acid. Subsequently, the purified salt is converted into the sulphate through added calcium salts, the required calcium sulphate being regenerated from the lime tartrate. In this way, the added tartaric acid is almost quantitatively recovered and is used again. In these trials difficulties were experienced in effecting the complete conversion of the lime tartrate, in filtering the different solutions in the centrifuge and in the final recovery of potash sulphate by double decomposition. These difficulties could be

easily overcome on a large scale manufacture, following careful analysis of the different chemicals and products secured and by employing a filter press in place of the centrifuge.

a. Precipitation as Cream of Tartar. I Molasses. Raw Molasses was treated and clarified in the manner described in the last report. In the first experiment, 5 cwts. of Molasses were used, while in the second and third trials, about $2\frac{1}{2}$ cwts. were taken. The insoluble matter sedimented on cooling and the ~~mix~~ dilution was kept uniformly at 33 Be.

for . II. Tartaric acid. Lime tartrate was purchased ~~from~~ these trials. 132 lbs. of the tartarate were decomposed in 3 lots with the required amount of sulphuric acid. The combined magma was centrifuged to obtain the tartaric acid liquor. As this was in progress, the centrifugal machine gave trouble and required complete overhauling, in spite of the fact that this was repaired before I went over to the Factory in March 1944. This overhauling took over a week and the loss in tartaric was much, while the remaining liquor was decanted and added to molasses. The amount of tartaric acid absorbed by the calcium sulphate was only partially recovered by washing by decantation and the recovery in this was is poor.

In the second experiment only 90 lbs. of the lime tartrate were processed and the fairly clear centrifugate was added to molasses. Here too, the precipitate was not washed.

In the third set, the calcium tartrate recovered from the two previous trials after loss of substantial quantities, was employed. Nearly 100 lbs. were converted with sulphuric acid. As this precipitate contained nearly 17% calcium carbonate, the degree of conversion was less, only about 25 lbs. of tartaric acid having been added to 260 lbs. of molasses. The volume of added acid liquor amounted to 26 gallons. Here again, the calcium sulphate precipitated was not washed to recover the free acid. The acid was estimated in the liquor by the potassium acid tartrate method and was about 25 lbs. whereas it should have been over 48 lbs. if there was no carbonate in the lime tartrate taken.

III. Cream of tartar precipitate. Shortly after the mixture of tartaric acid liquor and molasses is stirred well and allowed to stand, there occurs a precipitation, the rate of sedimentation of which depends on the nature of the container. In a narrower vessel, it deposits well and compact. In wider tubs, it settles like a crystalline magma and not like a crystalline deposit. It must be emphasised that the quantity of tartaric acid will react stoichiometrically with the potash present, so much so that enough acid must be present to recover the potash initially contained. The potash reaction is affected by the quantity of lime present in molasses, being taken up by lime also to some extent. As a rule soluble calcium in molasses is low. In the present trials, it was observed that the molasses apparently contained more lime than usual.

The precipitate settled usually in 60-72 hours, since the vessels were wide. The control of acidity by pH measurements was not possible. An excess of tartaric acid as required in the process was impossible.

In the first two trials, a crude wet precipitate recovered after centrifuging weighed nearly 112 lbs. which after drying weighed 90 lbs. and showed a purity of 40% as indicated by titration against alkali. In the last experiment, a weight of 35½ lbs. (not completely dry) was secured in the usual way. Depending on the tartaric acid added (25 lbs) we should have secured nearly 31 lbs. of which a part is soluble and some acid would have reacted with the lime. For all these possibilities, a loss in yield of 10 lbs. is allowed. This amount would not increase if more tartaric acid were added. Hence, the quantity of cream of tartar actually obtained in this trial was about 20-21 lbs. It must be emphasised here that this quantity of cream of tartar bears some relation to the quantity of potash initially present in the molasses taken, only part being ~~precipitated~~ precipitated, but is conditioned mainly by the amount of tartaric acid. The low yield is due to this last factor. The recovery of potash cannot be percentaged on that taken or contained in molasses.

It was not convenient to wash thoroughly these precipitate for fear of further losses of cream of tartar.

(b). Conversion of Cream of tartar to Potash Sulphate. This process is a standard one requiring ~~xxx~~ calcium carbonate and calcium sulphate and is effected in two stages. The acid tartrate is first neutralised with the carbonate to realise the soluble tartrate of potash from which the sulphate of potash is obtained by double decomposition with calcium sulphate.

The first reaction is readily carried out with the aid of litmus paper. In these experiments, the fact that the cream of tartar precipitates were not free ~~from~~ from molasses, complicated this test with the result more carbonate was added than was needed. This excess was very much more than is demanded as was referred to above in respect of the lime tartrate used for the third set. The liquor was somewhat weakly acidic always. In the first two precipitates, weighing 90 lbs. 5 lbs. of lime had been added and 20 lbs. of carbonate, both of which should have neutralised at least 112 lbs. of cream of tartar. On this basis, more than 42 lbs. of calcium sulphate were added. This accounts for such a large quantity of sulphate in the calcium tartrate recovered from this conversion process. On the neutralisation data, we should have realised at least 50 lbs. of potash sulphate as compared with the actual 7 and odd pounds. On the other hand, 90 lbs. of cream of tartar (with a purity of 40%) would yield about 17 lbs. A recovery of 7 lbs. against 17 in the first trial, particularly with the equipments and with men accustomed to such work should speak well of the process. A recovery of 40-50 per cent was reckoned. The potassium sulphate solution also recorded a sp. gr. of 1.30 from which it was expected to recover at least 12 lbs. In view of this discrepancy, it was considered necessary to operate a third set.

Unfortunately here also the addition of calcium carbonate and sulphate have not been carried out quantitatively and the data were vitiated. As mentioned before, 21 lbs. of cream of tartar were realised should yield theoretically 9.8 lbs. of potash sulphate.

After allowing for losses in centrifuging and for nonrecovery of the soluble salt from the precipitated calcium tartrate, the final yield of 5 and odd pounds would work to more than 75% recovery. The loss is estimated at about 3.25 lbs. The recovery is thus fairly high. In other words, in these trials a recovery of nearly 80% of the potash precipitated by tartaric acid from molasses has been recovered as the sulphate. With more careful operation, it should be feasible to secure almost all of the potash precipitated in the first reaction. The chemist has been asked to recover the potash from the lime tartrate. The salt so obtained after recrystallisation weighed over 5 lbs and showed a purity of over 98% as K_2SO_4 .

B. FERMENTABILITY OF TREATED MOLASSES. The molasses after removing the bitartrate and excess (if any) of tartaric acid from the first set, was nearly 23° Be and had to be diluted further before being fermented. It was then diluted to 17 Brix as practised in the distillery at Mandya. Sulphuric acid and ammonium sulphate were added as usual and the solution fermented with suitable controls being run with untreated raw but diluted molasses. Readings were taken periodically, both on the test solutions and the controls for fall in Brix and for gas production. In both cases almost identical readings were obtained at all times of test. Finally when the reaction had stopped, the Brix fell to about 2.0. Definite volumes of both solutions were distilled to recover the alcohol. Under the same conditions of experiment the test solution yielded 5.9% alcohol as also the control (5.9% alcohol).

A second fermentation test was carried out with molasses treated in the second test. The usual controls were run. The various factors such as gas production, fall in sugar content were found to agree closely with those of controls. In this case, the yield of alcohol was 6.1 in both samples.

The molasses treated in the first two sets was diluted to 17° Brix and fermented after adding acid and salt as above, in a large container, in the distillery to imitate the factory trials. The fermentation proceeded normally. Nothing particular was noticeable.

It may therefore be concluded that the treatment proposed and recommended herein does not affect the yield of alcohol nor does it damage the sugar content therein.

These tests were carried out in the distillery by the staff there under ~~XXXX~~ instruction from the ~~XXXX~~ Chief Chemist, whose valuable help in these trials is hereby acknowledged. The results were obtained from the laboratory.

C. THE ECONOMY OF THE PROCESS.

1. Tartaric Acid. In order that the process may be carried out economically, it is necessary that the amount of lime tartrate or of tartaric acid employed initially, is quantitatively recovered--Although individual figures have not been recorded, for each trial, it was found in the last trial that the loss in lime tartrate was very little. Lime tartrate is very insoluble and the loss in this way is negligible. A loss of 0.2% on the volume of diluted molasses is low indeed. The replacement is thus of insignificant value in the economy of the process.

2. Sulphuric Acid. The quantity of sulphuric acid employed will depend on that of the lime tartrate recovered which will be a function of tartaric acid required to react with potash in molasses and to

maintain an excess as required by the process. Any further quantity needed to react with lime present in molasses would be a variable factor, requiring control in the process of sugar manufacture. Large excess of lime must be avoided, and any such excess must be removed carefully. Otherwise the quantity of sulphuric acid needed will be large.

ADDITIONAL REMARKS. In evaluating the utility of this process for a large scale adoption, the following improvements will be necessary.

1. Complete analysis of lime tartrate, cream of tartar separated, calcium carbonate and sulphate used for converting the cream of tartar and finally of potassium sulphate recovered and of potash present initially in molasses. This has not been done in these trials.

2. The effective conversion of lime tartrate to tartaric acid with added sulphuric acid is best done mechanically and not through human labour. The temperature control is quite essential.

3. The washing of the calcium sulphate to recover the absorbed tartaric acid is best done in a filter press. Excess sulphuric acid must be eliminated. The tartaric acid added must be concentrated to economise volume and space.

4. The precipitated cream of tartar will have to be freed of adhering molasses and the liquid so obtained may be used to dilute molasses. Thus the contamination of cream of tartar with molasses is avoided.

5. The purity of cream of tartar has to be checked carefully. Calcium sulphate is required in molecular ratio to that of the carbonate. The final conversion will have to be carefully tested to tartrate in the liquor and for potash in the precipitate.

6. The precipitate of lime tartrate finally obtained must be washed ~~in molasses~~ free of potash sulphate.

7. The solid materials processed and used at different stages must be in a finely divided form to bring out quick reaction.

-1----

P.T.O. for Appendix.

Appendix.

The results of a typical experiment are reproduced below:

Quantity of Molasses taken	..	260 lbs.
Density to which it was diluted		33° Be.
Weight of ~~lime~~ tartrate taken for decomposition with sulphuric acid		110 lbs.
<u>Purity.</u> Lime tartrate	..	72.5 lbs.)
Calcium carbonate	18.7 "	)
Calcium sulphate	18.8 "	)
Moisture content	26.2 %	)
Pure lime tartrate has a moisture content of	27.7%	)

Total quantity of Sulphuric acid needed 50 lbs. of 98% acid
Total -do- added 33 lbs. of commercial acid

(Weight of tartaric acid expected .. 41.2 lbs.
(Weight -do- actually estimated
in 26 Gals. of liquor 25.0 lbs.

(Weight of potash bitartrate on the basis of
(added tartaric acid .. 31.2 lbs.
(Weight of crude salt .. 35.35 lbs.
(Weight of pure salt after allowing for
(losses by solubility etc., .. 21.0 lbs.
(Weight as based on added calcium carbonate 75.2 lbs.
(

(Weight of potash sulphate on the basis of
(added tartaric acid .. 13.1 lbs.
(Weight as based on cream of tartar secured 9.8 lbs.
(Weight of crude potash sulphate secured 6.6 lbs.
(Weight after purification .. 5.1 lbs.
(

(The loss in recovery is due to varying causes
(such as absorption by lime tartrate, loss
(while centrifuging etc.
(If the loss is eliminated, the recovery is more.

Sd. A.V. Varadaraja Iyengar.

LRK/20/10/44.

copy

✓ H. M.
20/10/44

C.E.Noronha, M.A., *General and Revenue Secretariat,*
Secretary to Government,
Development Department.

Bangalore, Camp Mysore, 16/10/ 1945.



D. O. No.

2486 Encls 19
Encls: 12 Pgs.
Dear Sir,

Subject:- Recovery of Potash Salts from
molasses - Scheme of Dr. A.V.Varada-
rajaengar.

In inviting reference to your D.O. letter No.
D.1744 dated 6th December 1940, to the Secretary, -
Industrial Research Board (copy enclosed) recommend-
ing the taking up of the scheme mentioned above, I am
desired to state that Dr. Varadaraja Iyengar has since
conducted the investigations at the Mysore Sugar - -
Factory at Mandya and copies of his reports and the
review of the General Manager, Sugar Company, thereon
in original are sent herewith.

I am to request you to be so good as to examine
these papers and to furnish your remarks as to whether
it is worthwhile pursuing the experiments further or
whether they may be dropped.

The original papers sent herewith may be kindly
returned when done with.

Yours sincerely
C. E. Noronha

Sir J.C.Ghosh, D.Sc., F.N.I.,
Director, Indian Institute of Science,
B a n g a l o r e.

Jsk.

J. P. 53-40-8 28.66

SIR JNAN CHANDRA GHOSH,

Kt., D.Sc., F.N.I.,

DIRECTOR.

INDIAN INSTITUTE OF SCIENCE,

MALLESWARAM P.O., BANGALORE.

Telegrams: "SCIENCE", BANGALORE.

Date the 29th Oct. 1945 -

Ca m

m HSR

Secretary, Development Dept.

No useful purpose will
be served by continuing these experiments further

J. Ghosh
29/10

367
130/10

G.P. 53-40-10 3111
820

M. K. Menon
14. XI. 45.

The Secretary,
Board of Scientific & Industrial Research,
General & Revenue Secretariat,
Bangalore City

#862

2566

Dear Sir,

I write to acknowledge with thanks the receipt of your letter No. D. 3276 dated the 18th inst. with the enclosures. (original correspondence with the Mysore Symb.)

Yours faithfully
M. K. Menon

BS 9A
P. 12/11/45

463 -

- 28741

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Appendix F. G.—1]

SUBJECT..... Manufacture of Potash Salts by
Dr. A. V. Varadachari

Section 28.
File No. 58/uo
Serial No. 11

Diary No. of letter replied to.....

General and Revenue Secretariat
()
the 194 .

No. D 44/1
To The Secretary
Mysore Hydr. Company
Bangalore

ate of issue... 5/12

Signed by... M. J. S.
Dear Sir,
With ref. to correspondence
ending with your letter
no. 489 dated 18/7/1945—
on the above subject, I
am desired to state
in the circumstances,
that the proposal of
the Company to stop
the continuation of the
above expts. is approved.
In this connection, I
am to advise ref. to the
of the letter no. D 12 / 2.8.50
-40

List of enclosures.....

Copied by.....

Examined by.....

Dated 11th October 1945 - Regarding
the Remittance of Rs. Varadanga
to you you kindly to expedite
the settlement of the final
account to you in the
future in the matter.

Ish.

12/10/45
R. D. D. S.
3911

GOVERNMENT OF HIS HIGHNESS THE MAHARAJA OF MYSORE

General and Revenue Secretariat

No.

Dated, Bangalore, _____

From

The Additional Secretary to the Government of His Highness
XXXXXX the Maharaja of Mysore.

To

development department.

The Secretary,
Mysore Sugar Company Ltd.,
Bangalore.

Sir,

xxx

subject:- manufacture of potassium salts by
Dr. A. V. Varadarajalingar.

dear sir,

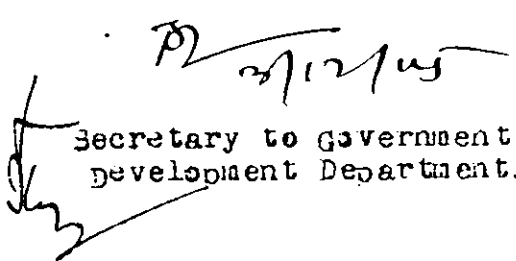
with reference to correspondence ending with your letter No. 489 dated 18th July 1945, on the above subject, I am desired to state that in the circumstances the proposal of the company to stop the continuance of the above experiments is approved.

In this connection, I am to invite reference to this Office letter No. pl2./I.p.50-40 dated 11th October 1945 regarding the remuneration of Dr. Varadarajalingar and to request you kindly to expedite the settlement of his final account, and to report the action taken in the matter.

I have the honour to be

sir,

Your most obedient servant,


Secretary to Government,
Development Department.

The Mysore Sugar Company, Ltd.

SRI JAYACHAMARAJA WADIYAR ROAD, BANGALORE CITY

Ref. No. 5892

Dated 5th Decr. 1945.

The Secretary to Government,
Development Department,
BANGALORE.

Dear Sir,

Subject: Manufacture of Potassium Salts
by Dr. A.V. Varadaraja Iyengar.

529
16/12

As desired in your letter No.D-12/IP/X53-40 dated the 11th October 1945, the question of remuneration to be paid to Dr. Varadaraja Iyengar in connection with the experiments conducted by him for the extraction of Potash from Molasses was considered by the Board of Directors at their meeting held on the 1st December 1945 and they have come to the conclusion that there is no need to make any further payment to Dr. Iyengar as he had already been paid a sum of Rs.964/- including Rs.664/- on account of T.A. as against Rs.600/- fixed as remuneration in his original scheme.

A copy of the Resolution of the Board is sent enclosed together with that of the approved budget of the original scheme.

Yours faithfully,
THE MYSORE SUGAR CO.LTD.,

Subbarayappa,
Secretary.

TRR
Enc.2.

THE MYSORE SUGAR COMPANY LTD., BANGALORE.

Extract from the Proceedings of the Meeting of the
Board of Directors held on 1st December 1945.

*

*

*

Subject No. IV - Remuneration payable to Dr. A.V.
Varadaraja Iyengar for his experiments
on the manufacture of Potassium Salts.

Read letter No. D12-IP/53-40 dated 11th October 1945 from the Secretary to Government, Development Department, suggesting that the question of remuneration payable to Dr. Varadaraja Iyengar in connection with his experiments on the manufacture of Potassium Salts may be placed before the Board, giving an opportunity to Dr. Varadaraja Iyengar to present his case.

had

As the Board/in possession all the information relating to the experiments the presence of Dr. Varadaraja Iyengar was not considered necessary at the meeting.

After considering the circumstances of the case, it was RESOLVED that there was no need to make any further payment to Dr. Varadaraja Iyengar as he had already been paid a sum of Rs.964/- as against Rs.600/- fixed as remuneration to him in the Resolution of the Board dated 23rd February 1942.

Sd/- A.A. KHAN
CHAIRMAN

'COPY'

S. Subbarayappa

SECRETARY

Approved budget of the original scheme for experiments for the recovery of Potash from Molasses.

a) To cost of equipment needed for recovering potash sulphate from 5 cwts. of Molasses per day ..	Rs.2,000/-
b) To erect a temporary shed-- 50' x 20' x 16' ..	900/-
To equipment for tartaric acid extraction from tamarinds and to purchase of tamarind fruits	550/-
b) To working charges at Rs.10/- per day ~~for~~ 40 days ..	400/-
to labour in the initial stages	50/-
c) Allowances to Dr. Varadaraja Iyengar for the entire period ..	600/-

Miscellaneous ..	4,500/-
	250/-

Total	4,750/-

TRR/5-12-45.

Subbarayappa

S. P. 53-40-12

To. Dr. A.V. Varadarajaperumal
Biochemist,
B.H. Othi

Melmarum P.O.

Dear Sir

Subj: Recovery of Potash Salt-
from molasses.

~~Dear Sir~~ In continuation of
this office letter no. D 2485/89.
53-40-7 dated 19-10-1945
on the above subject, I
am directed to state that
after a further consideration
of the matter, the Board
of Directors of the Mys
Sugar Co. Ltd. have ordered
that there is no need
to make any further

payment to you, as they have
 already paid a sum of Rs 964/-
 as against Rs 600/- fixed as
 remuneration. In the circumstances,
 I can consider that nothing more
 could be done in the matter.

Yours truly,

B. S. 1/11/6
 D. S. 1/11/6
 D. S. 1/11/6

D. S. 1/11/6
 D. S. 1/11/6
 D. S. 1/11/6

Copy to the Secy, Mys. Dist. G.O.
 Bangalore.

B. S. 1/11/6
 D. S. 1/11/6
 D. S. 1/11/6

Mr. T. Shanappa, M.A.,
Asst. Secretary to Govt.,
Development Department.

D 5684

4/2
January 1946.

Dear Sir,

Subject:- Recovery of Potash Salts from molasses.

In continuation of this office letter No.D.2485/J.P.53-40-7 dated 19th October 1945 on the above subject, I am desired to state that after a further consideration of the matter, the Board of Directors of the -- Mysore Sugar Co., have resolved that there is no need to make any further payment to you, as they have already paid a sum of Rs.964/- as against Rs.600/- fixed as remuneration. In the circumstances, Government consider that nothing more could be done in the matter.

Yours faithfully,

Sd. C.E. Noronha.

Dr.A.V.Varadarajaiengar, B.A., D.Sc.,
Biochemist, Malleswaram P.O.,
Bangalore.

p.t.o.

memo no.

D 5685

-2-

4/2

Dated, Bangalore,

~~January 1946.~~

Copy of the foregoing is forwarded with compliments, to the
Secretary, Mysore Sugar Co., Ltd., Bangalore.

By Order,

TS 2871

Secretary to Government,
Development Department.